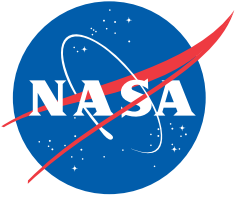


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Compendium of Director's Colloquia 1999-2012

*Dr. Stephanie Langhoff
Chief Scientist (June 29, 1998 - March 12, 2012)
Ames Research Center, Moffett Field, California*

Report of a collection of Colloquia
sponsored by and held at
NASA Ames Research Center
Moffett Field, California
from 1999-2012

May 2013

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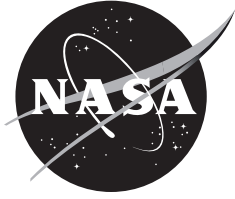
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National Aeronautics and
Space Administration

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May 2013

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Compendium of Director's Colloquia (1999-2012)

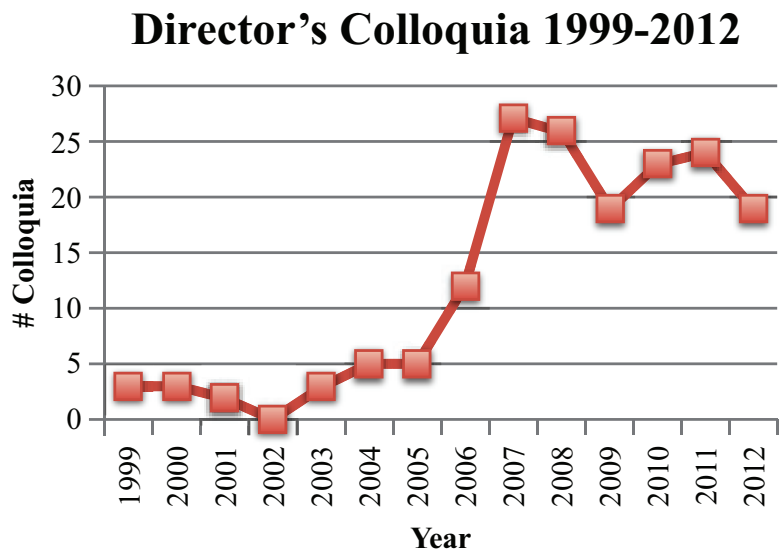
Dr. Stephanie Langhoff, Chief Scientist (June 29, 1998 to March 12, 2012)
Ames Research Center, Moffett Field, California

Introduction

The Director's colloquium series was established primarily to provide a mechanism to bring high profile individuals to the Center to present new and innovative ideas to the entire Ames staff. More focused lecture series are arranged by specific divisions or departments. Before the year 1999, there is only a fragmentary record of who spoke in this series. Announcements to the staff were sent via land mail, and tickets were required to attend the colloquium. In 1999, the notification to attend colloquia became electronic and the entire resident staff was invited to attend. The centerwide announcement archive established in this timeframe created a lasting record of the Director's colloquia.

The "Office of the Chief Scientist" at Ames had the responsibility for administering the colloquium series. When I became Chief Scientist on June 29, 1998, the program was not being used extensively and this continued to be the case through the years 1999-2002 of Harry McDonald's tenure as Director (see graph below). During Scott Hubbard's tenure as Director (September 19, 2002- February 15, 2006), the Director's colloquium series was used exclusively for high profile speakers from outside Ames whom he selected, such as lab directors from other research organizations around the Bay Area. During Pete Worden's tenure as Ames Director (May 4, 2006 -present) the colloquium series gained far greater use. First, I had greater discretion to select speakers for the colloquium series. Secondly, beginning in 2007, we established a 10-week Director's Colloquium Summer Series focused on enriching the experience of our many summer interns, and giving our top researchers within Ames Research Center an opportunity to present their work to the Center. The summer program has received rave reviews.

This compendium contains a compilation of one-page descriptions (title, abstract and speaker biographies) for all of the 171 colloquia presented from the beginning of 1999 to October of 2012. The list of speakers includes four Nobel Laureates, six astronauts, three current or former Ames Center Directors, as well as many CEOs and other lab directors. Other featured speakers include famous mountain climbers, historians, movie stars, and former FBI agents and directors. Finally, the list includes world-class scientists and engineers representing a wide range of disciplines. It has been my privilege to host almost all of the colloquia presented in this compendium.



Frequency of the Director's Colloquia from 1999-2012

Director's Colloquia (1999-2002)

- 1999-1 (2/26/1999) Professor Murray Gell-Mann
Some Aspects of Theory Relevant to Astrobiology
- 1999-2 (4/19/1999) Astronaut Stephen K. Robinson
The Flight of Discovery STS-95 from a Crew Perspective
- 1999-3 (11/2/1999) Max Noel FBI agent
The Search for the UNABOMBER
- 2000-1 (3/29/2000) Dr. Baruch Blumberg
From Hepatitis B Virus to Space
- 2000-2 (4/10/2000) Professor Yacov Haimès
Risk Assessment and Management in a Multiobjective Framework
- 2000-3* (10/16/2000) Robert Hoffman mountain climber
Everest Environmental Expedition 2000: Mission Success with Extreme Risk
- 2001-1 (2/13/2001) Dr. Rita Colwell
Climate and Health: Monitoring Cholera Epidemics by Satellite
- 2001-2* (12/10/2001) Alexander Jefferson
Tuskegee Airmen

There were no Director's Colloquia in 2002

*Denotes that the colloquium is available on DVD in the library

1999-1: Director's Colloquium by Professor Murray Gell-Mann

Professor Murray Gell-Mann will present a Director's Colloquium entitled "Some Aspects of Theory Relevant to Astrobiology" this coming Friday, February 26th in the Space Sciences Auditorium in Bldg. 245 at 2:00pm. Seating is limited and is on a first-come basis. An abstract for his talk and a biography are given below. If you are interested in the field of astrobiology, I think you will find his presentation very stimulating.

Abstract: Various concepts of simplicity and complexity will be presented, as well as trade-offs among measures of complexity. The widespread tendency for more and more complex entities to appear as time goes on will be discussed, along with the compatibility of that tendency with the second law of thermodynamics. Effective complexity is related to the length of a concise description of the regularities of an entity as opposed to features that are treated as random or incidental. Thus the study of complexity is intimately connected with the identification of regularities, which is, of course, crucial in astrobiology. Examples of regularities will be discussed, particularly ones involving scaling laws or dependence on coarse graining.

Biography: Murray Gell-Mann is Professor and Co-Chairman of the Science Board of the Santa Fe Institute, and author of the popular science book, *The Quark and the Jaguar, Adventures in the Simple and the Complex*. In 1969, Professor Gell-Mann received the Nobel Prize in physics for his work on the theory of elementary particles. Professor Gell-Mann's "eightfold way" theory brought order to the chaos created by the discovery of some 100 particles in the atom's nucleus. Then he found that all of those particles, including the neutron and proton, are composed of fundamental building blocks that he named "quarks." Forces coming from the exchange of "gluons" permanently confine the quarks. He and others later constructed the quantum field theory of quarks and gluons, called "quantum chromodynamics," which seems to account for all the nuclear particles and their strong interactions.

Besides being a Nobel laureate, Professor Gell-Mann has received the Ernest O. Lawrence Memorial Award of the Atomic Energy Commission, the Franklin Medal of the Franklin Institute, the Research Corporation Award, and the John J. Carty medal of the National Academy of Sciences. He has been awarded honorary doctoral degrees from many institutions, including Yale University, the University of Chicago, the University of Turin, Italy, and Cambridge and Oxford Universities, England. In 1988 he was listed on the United Nations Environmental Program Roll of Honor for Environmental Achievement (the Global 500). In 1994 he shared the 1989 Erice "Science For Peace" Prize. Professor Gell-Mann is the Robert Andrews Millikan Professor of Theoretical Physics Emeritus at the California Institute of Technology, where he taught from 1955 until 1993. He is a director of the J.D. and C.T. MacArthur Foundation, a member of the National Academy of Sciences, a member of the American Academy of Arts and Sciences, a Fellow of the American Physical Society, and a Foreign Member of the Royal Society of London.

1999-2: Director's Colloquium by Astronaut Stephen K. Robinson

Astronaut Stephen K. Robinson, Ph.D., will present a Director's colloquium on Monday April 19, 1999, at 12:30 p.m. in the Main Auditorium. He will speak on the subject "The Flight of Discovery STS-95 from a Crew Perspective". Ames provided experiments and technologies for the STS-95 mission, a mission that furthered our understanding of the Sun, conducted numerous microgravity and life science experiments, and featured the return to flight of Senator John Glenn.

The STS-95 mission aboard the Shuttle Discovery launched at 1:19 p.m. on October 2, and landed on November 7, 1998 at the Kennedy Space Center. During the mission a suite of life and microgravity science experiments were completed in the pressurized SPACEHAB module, the Spartan free-flyer payload to study the sun was deployed and retrieved, and operations with the HST Orbiting Systems Test (HOST) and the International Extreme Ultraviolet Hitchhiker (IEH) payloads located in the payload bay were conducted. Shuttle commander Curt Brown with Steven Lindsey as the pilot led the mission. Mission Specialist-1 Stephen Robinson served as the payload commander, and Dr. Scott Parazynski was the flight engineer and Mission Specialist-2. Astronaut Pedro Duque from the European Space Agency served as Mission Specialist-3. Chiaki Mukai from the Japanese Space Agency and Senator John Glenn served as Payload Specialists. STS-95 marked Senator Glenn's return to space more than 36 years after he made history as the first American to orbit the Earth.

Stephen K. Robinson started work for NASA Ames Research Center in 1975 as a student co-op. After graduation from the University of California at Davis, he joined NASA Ames as a research scientist in the fields of fluid dynamics, aerodynamics, experimental instrumentation, and computational scientific visualization. While at Ames, Robinson earned masters and doctorate degrees in mechanical engineering at Stanford University, with research emphasis in turbulence physics and additional research in human eye dynamics. In 1990, Robinson was selected as Chief of the Experimental Flow Physics Branch at NASA's Langley Research Center in Hampton, VA, with responsibility for 8 wind tunnels and an engineering staff engaged in aerodynamics and fluids research. In 1993, Robinson was awarded the NASA/Space Club G.M. Low Memorial Engineering Fellowship, and was assigned for 15-months to the Massachusetts Institute of Technology (MIT) as Visiting Engineer in the Man Vehicle Laboratory (MVL) where he participated in the STS-58 mission. Dr. Robinson was selected as an astronaut in December 1994. In 1995 after completing a year of training and evaluation he was assigned to the Shuttle Avionics Integration Laboratory (SAIL) for the Astronaut Office Computer Support Branch. In 1997 he flew as a mission specialist on STS-85 and logged over 284 hours in space. In 1998 Dr. Robinson spent over 210 hours in space as the Payload Commander for the STS-95 mission.

1999-3: Director's Colloquium by Max Noel

There will be a Director's Colloquium at 2:00 PM on Tuesday, November 2, 1999 in the Main Auditorium, Bldg. 201. The speaker will be Max Noel, whose distinguished career in the F.B.I. is described below. The title of his presentation will be "The Search for the UNABOMBER" He will review the seventeen year search for the UNABOMBER, discuss the investigation, the decision to publish the Manifesto, the identification and subsequent arrest and prosecution of Theodore J. Kaczynski as the individual responsible. I think you will find his presentation fascinating. All Ames staff is cordially invited. No tickets are required. The audience will be seated on a first come basis.

Short resume of Max Noel's career:

I graduated from Nebraska Wesleyan University in Lincoln, Nebraska in 1968. I worked as an investigator/child welfare worker for the Hall County Welfare Department in Grand Island Nebraska for two years following my graduation. I then went to work for the Grand Island Diocese of the Catholic Church as the Director of a Neighborhood Youth Corps Program. I also was employed as a coach at Grand Island Central Catholic High School. In 1968, I entered on duty as a Special Agent of the F.B.I. After successfully completing the New Agents training school at Quantico, Virginia, I was assigned to the Sacramento Field Office of the F.B.I. After one year working in Sacramento, I was transferred to the San Francisco Field Office and worked there until my retirement in February 1999. During my 31-year career I was fortunate enough to have worked on several high profile investigations including several airplane hijackings in the early 1970's, the Patty Hearst investigation, the Chowchilla kidnapping case and numerous others. I was the co-case Agent on the labor racketeering case in the mid-1980's that led to the successful prosecution of sitting Federal District Court Judge Robert P. Aguilar of San Jose.

2000-1: Director's Colloquium by Dr. Baruch Blumberg

Dr. Baruch Blumberg will present the Director's Colloquium next Wednesday, March 29th, at 2:00PM in the main auditorium. The title of his presentation is "From Hepatitis B Virus to Space". Ames staff and visitors are cordially invited to attend what promises to be a fascinating discussion of the differences in scientific process and style between the search for viruses and their effects and the search for the origin of life. An abstract of his presentation follows:

Hepatitis B virus (HBV) is one of the most common of the viruses that afflict humans. There are about 375 million people in the world who are chronically infected with HBV and many of them are at increased risk of developing chronic liver disease and primary cancer of the liver (hepatocellular carcinoma, HCC). HCC is one of the most common cancers in the world; it is the third most common cause of death from cancer in males and the seventh most common cause in females. About 85% of HCC cases are due to chronic infection with HBV. Another hepatitis virus, HCV, is responsible for most of the remainder.

The discovery of HBV came about in a circuitous manner as a consequence of a search for inherited factors that affect susceptibility to disease. There is now a significant amount of information about the inherited factors that influence susceptibility to chronic infection with HBV, and how these gene products interact with the environment. The invention of the vaccine that protects against HBV infection was based on epidemiological observations on the distribution of the naturally occurring antibodies that protect against HBV infection. The vaccine is now used worldwide and has resulted in a marked decrease in the number of people infected with HBV and in the incidence of cancer of the liver. The scientific process that resulted in these discoveries will be described. In 1999 I joined the NASA astrobiology program. I will discuss the interesting differences in scientific process and style between the search for viruses and their effects, and the search for the origin of life on Earth, and in the Universe.

2000-2: Director's Colloquium by Yacov Haimes

Next Monday, April 10th at 2:00pm, Professor Yacov Haimes of the University of Virginia will present a Director's Colloquium in the Main Auditorium, Bldg 201. The title of his talk is "Risk Assessment and Management in a Multiobjective Framework". An abstract bio are given below. His topic of risk assessment is especially interesting considering the renewed emphasis given this topic recently by NASA Headquarters. All of staff is cordially invited to attend. I believe that this Colloquium will be particularly relevant for those individuals involved in project management or in the Design for Safety Initiative.

Abstract: This seminar will present the risk assessment and management process in the context of a holistic systems engineering philosophy, where all costs, benefits, and risks must be traded off in a multiobjective framework. In particular, in risk assessment, extreme or catastrophic events are often underestimated in comparison with less consequential events. Because risk managers often focus on the risk associated with a specific case instead of the likelihood of average outcomes, which may result from the various risk situations, the expected value of risk is not only inadequate, but can also lead to fallacious results and interpretations if used as the sole risk indicator. This seminar will show how using conditional expectation to modify the expected-value approach is better for assessing the risk of extreme and catastrophic events. Conditional expectation, derived through the Partitioned Multiobjective Risk Method (PMRM), can be defined as the expected value of a random variable, given that its value lies within some specific probability or an outcome range.

Bio: Yacov Y. Haimes is the Lawrence Quarles Professor of Engineering and Applied Science and Director of the Center for Risk Management of Engineering Systems at the University of Virginia. After receiving his Ph.D. at the University of California at Los Angeles, he has served on the faculty of the University of Virginia since 1987. He has authored or co-authored five books and over 200 editorials and technical publications, 120 of which appear in archival-refereed journals and encyclopedias. He is a former Congressional Science Fellow, sponsored by the American Association for the Advancement of Science and the American Geophysical Union. He has also edited or co-edited 17 books and is an associate editor of three archival journals: the IEEE Transactions of Systems, Man, and Cybernetics; Reliability Engineering and Systems Safety; and Risk Analysis. He sits on and chairs several national and international committees. He served as president of the Universities Council on Water Resources. Previously, he chaired the systems engineering department of Case Western Reserve University and directed its Center for Large-scale Systems and Policy Analysis.

Yacov Haimes' research interests include risk-based decision making, multiobjective tradeoff analysis, and hierarchical analysis of large-scale systems. He has applied his research results to water resources and environmental and industrial systems. For further details see (<http://www.cs.virginia.edu/SEAS/systems.html>)

2000-3: Director's Colloquium by Robert Hoffman, Everest Environmental Expedition 2000 Leader

You are cordially invited to attend a Director's Colloquium in the main auditorium (Bldg N201) on Monday, October 16th, at 2:00pm. The speaker is Robert Hoffman, Expedition Leader for Everest Environmental Expedition (EEE) 2000. He is planning on bringing a model of Mt. Everest and a sample of the oxygen bottles that were removed from the mountain. He will be showing slides and a video excerpt taken during the expedition. This promises to be one of the most interesting Director's Colloquium that we have had in recent years. Seating is on a first come basis so please arrive a little early. A more detailed description of the mission and its relation to mission safety is given below:

Everest Environmental Expedition 2000: Mission Success with Extreme Risk

Abstract: Like NASA programs, the EEE 2000 had specific mission goals -- to bring in the new millennium with a heightened sense of environmental awareness and human accomplishment; to restore the mountain to its pristine state in honor of the 50th anniversary of the Hillary/Tenzing first ascent in 1953; to bring back more trash than any other expedition in history; and to set the world record for number of summits of Mt. Everest, the world's highest mountain. Also like NASA, this expedition's core value was safety first. The mission goals were achieved. All climbers returned safely, a record amount of trash was recovered, repatriated, and recycled, including over 600 oxygen bottles. Also, famed climbing leader, Apa Sherpa, achieved his 11th summit, setting a world record.

Bio: Mr. Robert Hoffman, the Expedition Leader from Belmont, California, will discuss this historic mission from April to June in the extreme conditions of the 29,035 ft. peak, where the weather was worse than that during the 1996 disaster. In this environment, like in spaceflight, there can be an unanticipated confluence of events that must be addressed. This process can be called real time dynamic risk management. Even with the best mental and physical training and equipment, the weather and altitude can be deadly and climbers must be prepared for a worst case scenario at any time. That this team survived and did not panic is one difference between a private expedition such as EEE 2000 and the ill-fated 1996 expeditions. During this one-hour presentation, Mr. Hoffman will show slides and a video excerpt from a documentary that was filmed during this year's climb. Even with one eye frozen shut during the climb and frostbitten fingers still in recovery, he will try to convey why this handpicked team undertook this risky but crucial mission. This was Mr. Hoffman's fourth expedition to Everest. In the fall of 1992, Mr. Hoffman organized and was a member of the successful "Everest International Expedition." His wife Suzanne and daughter Allison support his passion for the mountains and devotion to the Sherpa people, and have learned to live with the risk of such expeditions. Mr. Hoffman was the Mayor of Belmont, and is an airline manager in "real life."

2001-1: Director's Colloquium by Dr. Rita Colwell

Dr. Rita Colwell, Director of the National Science Foundation, will present a Director's Colloquium at 1:00pm on Tuesday, February 13th in the Main Auditorium (N201). The title of her presentation is Climate and Health: Monitoring Cholera Epidemics by Satellite. An abstract of her presentation and a short biography follow. Everyone is cordially invited to attend.

Abstract: An environmental source of cholera was hypothesized as early as the late nineteenth century by Robert Koch, but not proven because of the inability to isolate *Vibrio cholerae*, the causative agent of cholera, from the environment between epidemics. Standard bacteriological procedures for isolation of vibrios from environmental samples, including water, between epidemics generally were unsuccessful because *Vibrio cholerae*, a marine vibrio, requiring salt for growth, enters into a dormant, "viable but nonculturable stage," when conditions are unfavorable for growth and reproduction. Recently, an association of *Vibrio cholerae* with zooplankton, notably copepods, has been established. Furthermore, the sporadicity and erraticity of cholera epidemics have now been correlated also with climate and climate events, such as El Nino. Since zooplankton have been shown to harbor the bacterium and zooplankton blooms follow phytoplankton blooms, remote sensing can be employed to determine the relationship of cholera epidemics with sea surface temperature (SST), ocean height (OH), chlorophyll, and turbidity. Cholera occurs seasonally in Bangladesh, with two annual peaks in a number of cases. From clinical data and data obtained from remote sensing, it has been found that when the height of the ocean is high and sea surface temperature is also elevated, cholera cases are most numerous. When the height is low and the sea surface temperature is also low, little or no cholera occurs. Because SST, OH, and blooms of phytoplankton and zooplankton can be correlated with cholera epidemics, selected climatological factors and incidence of *V. cholerae* can be recorded, bringing the potential of predicting conditions conducive to cholera outbreaks close to reality. Simple filtration interventions are in progress, taking into account the association of *V. cholerae* with plankton, and may prove to be a simple, although transient, solution to the age-old problem of controlling this waterborne disease.

Biography: Born in Beverly, Massachusetts, Dr. Colwell holds a B.S. in Bacteriology and a M.S. in Genetics, from Purdue University, and a Ph.D. in Oceanography from the University of Washington. Dr. Rita Colwell became the 11th Director of the National Science Foundation on August 4, 1998. Since taking office, Dr. Colwell has spearheaded the agency's emphases in K-12 science and mathematics education, graduate science and engineering education/training and the increased participation of women and minorities in science and engineering. Her policy approach has enabled the agency to strengthen its core activities, as well as establish support for major initiatives, including Nanotechnology, Biocomplexity, Information Technology, and the 21st Century Workforce. In her capacity as NSF Director, she serves as Co-chair of the Committee on Science of the National Science and Technology Council. Under her leadership, the Foundation has received significant budget increases, and its funding recently reached a level of \$4.4 billion.

2001-2: Director's Colloquium by Lt. Colonel Alexander Jefferson

I would like to invite Ames staff to a Director's Colloquium occurring next Monday, December 10th, at 2:00 PM in the Main Auditorium (N201). The speaker will be US Air Force, Retired Lt. Colonel Alexander Jefferson who is a member of the Tuskegee Airmen, Detroit Chapter. I think this will be a fascinating talk. I urge you to come early to ensure getting a seat. An abstract of his talk and details of his career from his web site are given below.

Abstract: Because of opposition from Army Air Corps and the U.S. Department it took an act of Congress on March 22, 1941, to create an all-black fighter squadron. He is one of 32 Black pilots shot down and locked up in a German prisoner of war camp during World War II. He will discuss a diversified number of items and topics, centering on how World War II changed the social, economical and psychological aspirations, hopes and accomplishments of Blacks. It will be done specifically from the standpoint of a Black combat pilot, prisoner of war, returning to the states and enduring the racial, political and social upheaval of post World War II.

Biography: In the Air Force, I became one of 450 airmen, African American pilots, who trained in Tuskegee, Alabama and fought over North Africa, Sicily and Europe. The Germans called us "Schwartzte Vogelmenchen," the "Black Birdmen," but to our fellow Americans we were the "Black Red-tail Angels," because of the red tails on our planes and our well deserved reputation of not losing a single bomber we were charged to escort to enemy fighters. I joined the 332nd Fighter group in 1944. Everyone knew the "red tails," they couldn't see the color of our skin through the oxygen masks and goggles, but they knew that as long as we were the escort, we'd bring them safely home.

Overseas I flew long-range missions escorting "15th Air Force" bombers. On my 18th mission my P-51 was shot down by German 20mm fire, while strafing radar installations on the coast of Southern France, outside of the harbor of the city of Toulon. When I bailed out, I landed in the middle of the German Gunners who had just shot me down! I was taken prisoner and kept in camps for allied officers. Stalag Luft III, 80 miles east of Berlin on the Polish border was the first, and then in Stalag VII-A in southern Germany (20 miles north of Dachau) was the second. I wrote about this adventure in "The Encounter. A True Story." To keep busy while I was a prisoner of war, I began to record my whole adventure in a number of pen and crayon drawings.

When the war finally ended in 1945, the Third Army liberated us. Back home, I became an instructor at the Tuskegee Army field, and in 1947 I was discharged from active duty. I remained in the reserves, and retired in 1969. I became a teacher in the Detroit public school system, and retired in 1979 as an assistant principal. My message to young people is that our country is not perfect, but our system of government is still "the best in the world." On Nov 9, 2001, at Wright Patterson Air Force Base, Air Force Museum, I was formally, awarded the Purple Heart, for injuries sustained on Aug 12, 1944, during a mission to knock out radar stations on the coast of southern France.

Director's Colloquia (2003-2004)

- 2003-1* (2/13/2003) Professor Steven Squyres
Mars Exploration Rover Project
- 2003-2* (4/16/2003) Dr. Stephen Wolfram
A New Kind of Science
- 2003-3* (10/21/2003) William Chana, Historian
Understanding and Appreciating the Wright Brothers
- 2004-1* (6/10/2004) Professor Doug Osheroff
The Discovery of Superfluidity in Helium-3 as Seen Through the Eyes of a Graduate Student
- 2004-2* (7/30/2004) Professor Steven Squyres
Latest science results from Spirit and Opportunity
- 2004-3* (8/10/2004) Professor Larry Smarr
The OptIPuter: Using Optical Networks to Create a Planetary-Scale Supercomputer
- 2004-4* (8/19/2004) Michael Anastasio
Creating a Star in the Laboratory
- 2004-5* (9/20/2004) Hans Mark
Feasibility of using electro-magnetic guns in naval warfare

*Denotes that the colloquium is available on DVD in the library

2003-1: Professor Steven Squyres to present a Director's Colloquium

Dr. Steven Squyres will present a Director's Colloquium at 2:00 p.m. on Thursday, February 13th in the Main Auditorium. The Ames staff is cordially invited to attend. Dr. Squyres is a Professor of Astronomy at Cornell University. He received his Ph.D. from Cornell in 1981 and spent five years as a postdoctoral associate and research scientist at NASA's Ames Research Center before returning to Cornell as a faculty member. His main areas of scientific interest have been Mars and the satellites of the outer planets. Research for which he is best known includes study of the history and distribution of water on Mars and of the possible existence and habitability of a liquid water ocean on Europa. He has participated in many of NASA's planetary exploration missions, including the Voyager mission to Jupiter and Saturn, the Magellan mission to Venus, and the Near Earth Asteroid Rendezvous mission. Dr. Squyres is currently the scientific Principal Investigator for the Mars Exploration Rover Project. He is also a co-investigator on the Mars Express mission, and on the Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment. He is a member of the Gamma-Ray Spectrometer Flight Investigation Team for the Mars Odyssey mission, and a member of the imaging team for the Cassini mission to Saturn. Dr. recently served as Chair of the NASA Space Science Advisory Committee and a member of the NASA Advisory Council.

The subject of his colloquium will be the Mars Exploration Rover Project, which is NASA's next mission to the surface of Mars. In early 2004, two large rovers will traverse the planet's surface and use a suite of science instruments to explore the elemental and mineralogical composition and history of Martian rocks and soil. The scientific focus of the mission is investigation of past water activity and habitability at the landing sites. Called the Athena Payload, the MER instruments include two high-resolution stereo cameras (Pancam) that will provide panoramic images of Martian surface features and aid in the selection of rock targets. The Mini-TES (Miniature Thermal Emission Spectrometer) will view the Martian landscape in the infrared. This will reveal the mineral composition of rocks and soils from afar and will complement the Pancam's survey of targets. The remaining four Athena instruments are located on the rover's robotic arm. These are the Mossbauer Spectrometer which will be used to identify iron-rich minerals in the soil; the APXS (Alpha-Particle-X-Ray Spectrometer) to measure most of the major elements in targeted samples; the RAT (Rock Abrasion Tool) to grind into Martian rocks and expose fresh surfaces for study; and the Microscopic Imager for close-up examination of Martian surface materials. The talk will describe the history and evolution of the Athena Payload, the current mission status, and how the rovers and their payloads will be operated at Mars.

2003-2: Director's Colloquium by Dr. Stephen Wolfram

Dr. Stephen Wolfram will present a Director's Colloquium on Wednesday, April 16th, from 10:30-11:30 in the main auditorium. He will discuss some key results from his new book entitled "A New Kind of Science". Starting from a collection of simple computer experiments, Stephen Wolfram shows how their unexpected results force a whole new way of looking at the operation of our universe. Wolfram uses his approach to tackle a remarkable array of fundamental problems in science, from the origins of apparent randomness in physical systems, to the development of complexity in biology, the ultimate scope and limitations of mathematics, the possibility of a truly fundamental theory of physics, the interplay between free will and determinism, and the character of intelligence in the universe.

Stephen Wolfram was born in London and educated at Eton, Oxford, and Caltech. He received his Ph.D. in theoretical physics in 1979 at the age of 20, having already made lasting contributions to particle physics and cosmology. In 1981 his work was recognized by a MacArthur award. In the early 1980s, he made a series of classic discoveries about systems known as cellular automata, which have yielded many new insights in physics, mathematics, computer science, biology, and other fields. In 1986 he founded Wolfram Research, Inc. and began the creation of Mathematica, now the world's leading software system for technical computing and symbolic programming, and the tool that made A New Kind of Science possible. Over the past decade Wolfram has divided his time between the leadership of his company and his pursuit of basic science.

This presentation promises to be particularly interesting, and an unusual opportunity to meet and listen to one of science's true giants.

2003-3: Director's Colloquium by William F. Chana

As part of the celebration of the centennial of powered flight, NASA Ames Research Center and the AIAA San Francisco Section will host AIAA Fellow and Distinguished Lecturer Fellow William F. Chana, speaking on "Understanding and Appreciating the Wright Brothers". This Director's Colloquium will be held in the N-201 Auditorium, Oct. 21, 2:00-3:30 P.M.

Abstract: An aerospace engineer, pilot and historian, Mr. Chana will cover Orville and Wilbur Wright's experiments from 1900 to 1910. Highlights of the talk will include: The 1900 and 1901 glider tests with low aspect ratio wings, the 1902 and 1903 tests with their successful high aspect ratio wing glider, and finally, their high aspect ratio powered machine. Also to be discussed is correspondence between the Wrights and Octave Chanute, George Spratt, and other early experimenters, their wind tunnel tests conducted between 1901 and 1902, and their advancements in controlled flight in 1904 and 1905 from Huffman's Prairie near Dayton, Ohio. The talk is illustrated with slides and a short video.

Mr. William F. Chana, began his aerospace career in 1941 at Consolidated Vultee in San Diego. He played an active role in flight-testing the XB-24, XB-32, XC-99, TBY, XFY-1 POGO, XF2Y-1 Seadart, and Convair Liners. In the early 1960s he was Convair's Base Manager for the Installation and Checkout of Atlas operational missiles at Fairchild Air Force Base, Washington. In the 1950s he built and flight-tested three small airplanes. He is a Fellow of AIAA and SAE, a member of EAA, Quiet Birdmen, OX-5. He is past President of the San Diego Aerospace Museum. In 1988 he held the A. Veruille Fellowship at the Smithsonian National Air & Space Museum. He is the National President of the Silver Wings Fraternity, an international organization of pilots.

All of staff is cordially invited to attend what I think will be a fascinating lecture celebrating the centennial of powered flight.

2004-1: Director's Colloquium by Professor Doug Osheroff

Professor Douglas Osheroff from Stanford will present a Director's Colloquium at 2:00pm on Thursday June 10th in the Main Auditorium. The title of his Colloquium will be "The Discovery of Superfluidity in Helium-3 as Seen Through the Eyes of a Graduate Student". This is his Nobel Lecture, which describes the serendipitous discovery of superfluidity in Helium-3, which he made during his 5th year of graduate study at Cornell University. He begins by tracing his development from a child to a graduate student, and then chronicles the chain of events that led to the discovery, including all the miss-steps and wrong conclusions along the way. It is a talk that anyone can understand and appreciate.

His current research interests center around studies of quantum fluids and solids and glasses at ultra-low temperatures. Professor Osheroff shared the 1996 Nobel Prize with David M. Lee and Robert C. Richardson for discovering superfluidity in helium-3. He is member of the National Academy of Sciences. Other honors include the Sir Francis Simon Memorial Prize for discoveries in low-temperature physics, the American Physical Society's Oliver E. Buckley Prize in Condensed Matter Physics, a Walter J. Gores Award for Excellence in Teaching and a MacArthur Prize. He was also a member of the Columbia Accident Investigation Board.

2004-2: Director's Colloquium by Professor Steven Squyres

On Friday, July 30th, at 2:00 p.m. in the Main Auditorium (N-201), Steven Squyres, Professor of Astronomy at Cornell University, will speak on the latest science results from Spirit and Opportunity. The pictures of Mars are spectacular, and the science performed by the MER rovers has given us a new level of understanding of the history of Mars. I highly recommend this colloquium, as Steve is an outstanding speaker. A description of Professor's Squyres research activities is given at URL: http://astro.cornell.edu/people/facstaff-detail.php?pers_id=112

2004-3: Director's Colloquium by Professor Larry Smarr

On Tuesday, August 10th, at 2:00 p.m. in the Main Auditorium (N201), Professor Larry Smarr will present a Director's Colloquium. He holds many distinguished positions including the Harry E. Gruber Chair, Department of Computer Science and Engineering at the University of California San Diego, Director, California Institute for Telecommunications and Information Technology, and Chair of the NASA Earth System Science and Applications Advisory Committee. A more complete bio is available at his web site http://www.calit2.net/people/bios/larry_smarr.html. I think you will find his visionary research quite interesting. The title and abstract of his Colloquium are given below. All of staff is cordially invited to attend.

“The OptIPuter: Using Optical Networks to Create a Planetary-Scale Supercomputer”

Abstract: While the Internet and the World Wide Web have become ubiquitous, their shared nature severely limits the bandwidth available to an individual user. However, during the last few years, a radical restructuring of optical networks supporting e-Science projects is beginning to occur around the world. Amazingly, scientists are now able to acquire the technological capability for private, high bandwidth light pipes (termed “lambdas”) which create deterministic network connections coming right into their laboratories. These dedicated connections have a number of significant advantages over shared internet connections, including high bandwidth, controlled performance (no jitter), lower cost per unit bandwidth, and security. By connecting scalable Linux clusters with these lambdas, one essentially creates supercomputers on the scale of a nation or even the planet Earth. One of the largest research projects on LambdaGrids is the NSF- funded OptIPuter (www.optiputer.net), which uses large medical and earth sciences imaging as application drivers. The OptIPuter has two regional cores, one in Southern California and one in Chicago, which has now been extended to Amsterdam. One aim of the OptIPuter project is to make interactive visualization of remote gigabyte data objects as easy as the Web makes manipulating megabyte-size data objects today. This requires parallel scaling up PCs to 100-1000x in display, storage, and compute power, while maintaining personal interactivity. We are currently expanding the collaboration partners to include NASA centers such as Goddard and Ames, coupling ocean and climate supercomputer simulations with vast earth satellite repositories across the country.

2004-4: Director's Colloquium by Dr. Michael Anastasio

On Thursday, August 19th, Dr. Michael R. Anastasio, Director, Lawrence Livermore National Laboratory (LLNL) will present a Director's Colloquium at 2:00 p.m. in the main auditorium (N201). As can be seen from his abstract below, he will describe the major accomplishments, challenges, and future promise of National Ignition Facility, as an introduction to the Stockpile Stewardship Program. All of staff is cordially invited.

Creating a Star in the Laboratory

Abstract: Late last year, the National Ignition Facility (NIF) began its transition from a major construction project to the largest laser experimental facility in the world. Today, construction and commissioning are proceeding in parallel with physics experiments. When all 192 beams are operating, NIF will make possible experiments that will allow scientists to examine the processes that power the sun and stars as well as the inner workings of nuclear weapons. NIF is a key element of the National Nuclear Security Administration (NNSA) Stockpile Stewardship Program (SSP), which ensures the safety and reliability of the nation's nuclear stockpile. In his talk, Dr. Anastasio will describe the major accomplishments, challenges, and future promise of NIF as an introduction to the SSP. The talk will summarize other key elements of the SSP, with particular emphasis on Advanced Simulation and Computing and LLNL's high-performance computing strategy. The 100-teraop Purple machine and BlueGene/L platform are scheduled for delivery early in 2005. Dr. Anastasio will also highlight a few examples of LLNL's ongoing R&D efforts with NASA and discuss opportunities for future collaborations.

Bio: Dr. Anastasio has a PhD in Physics from the State University of New York, Stony Brook. He joined the Laboratory in 1980 and was appointed the ninth Director of LLNL by the University of California Board of Regents in July, 2002. Founded in 1952, LLNL is one of the nation's two nuclear design laboratories and has been operated since its inception by the University of California, currently for the National Nuclear Security Administration (NNSA) within the U.S. Department of Energy.

2004-5: Director's Colloquium by Dr. Hans Mark

On Monday, September 20th, Dr. Hans Mark will present a Director's Colloquium at 2:00 p.m. in the main auditorium (N201) on the feasibility of using electro-magnetic guns in naval warfare. All of staff is cordially invited to attend.

Abstract: In 1999, a decision was made by the U.S. Navy's leadership to adopt the concept of an all-electric integrated power system for the next generation of surface warships, the DD(X) destroyer. The excess electric power available on these ships made it a practical proposition to arm them with electro-magnetic guns. These weapons are not limited by the thermodynamic constraints imposed on the muzzle velocities of conventional guns. A projectile fired by an electro-magnetic gun with a muzzle velocity of 2500 meters/second can achieve a range of about 450 kilometers. Such a weapon would clearly have important new military capabilities. The Navy has recently put a program in place to develop these weapons with funding of about \$250 million for five years. The current status of this program and the future prospects will be discussed.

Bio: Dr. Mark specializes in the study of spacecraft and aircraft design, hypervelocity projectiles and impact, and national defense policy. Currently he holds the John J. McKetta Centennial Energy Chair in Engineering in the College of Engineering at the University of Texas at Austin. He served as chancellor of The University of Texas System from 1984 to 1992. He previously taught at Boston University, Massachusetts Institute of Technology, University of California at Berkeley, and Stanford University. Dr. Mark has served as director of the NASA-Ames Research Center, Secretary of the Air Force, Deputy Administrator of NASA and most recently, the Director of Defense Research and Engineering. He has published more than 180 technical reports and authored or edited eight books. Dr. Mark is a member of the National Academy of Engineering and an Honorary Fellow of the American Institute of Aeronautics and Astronautics.

Director's Colloquia (2005)

- 2005-1* (1/20/2005) Dr. Sally Ride
Encouraging Girls and Women in Science and Engineering
- 2005-2* (2/22/2005) Paul Otellini
Riding Moore's Law
- 2005-3* (4/21/2005) Professor Jonathan Dorfan
The New Universe
- 2005-4* (4/28/2005) Dr. Bill Ballhaus
The Ten Most Important Lessons You Didn't Learn in Engineering School
- 2005-5* (5/19/2005) Dr. Sylvia Earle
Sustainable Seas- the Vision and Reality

*Denotes that the colloquium is available on DVD in the library

2005-1: Director's Colloquium by Dr. Sally Ride

On Thursday, January 20th, Dr. Sally Ride will present a Director's Colloquium at 2:00 p.m. in the main auditorium (N201) entitled, "Encouraging Girls and Women in Science and Engineering". All of staff is cordially invited to attend. Please arrive early to ensure a seat in the auditorium. I include a short biographical sketch below that details some of her more notable accomplishments.

Biographical sketch: Dr. Sally Ride received her B.S. and Ph.D. in Physics from Stanford University. As the first American woman in space, she is a veteran of two shuttle flights where she deployed communications satellites, operated the robot arm, and conducted experiments in materials, pharmaceuticals, and Earth remote-sensing. In 1989, Dr. Ride joined the faculty at University of California, San Diego as a Professor of Physics and Director of the University of California's California Space Institute. In 2001 she founded her own company, Imaginary Lines, to pursue her long-time passion: motivating girls and young women to pursue careers in science, math and technology. Long an advocate for improved science education, Dr Ride has written four science books for children: *To Space and Back*; *Voyager, The Third Planet*, *The Mystery of Mars* and *Exploring Our Solar System*. Dr. Ride has been a member of many prestigious committees, including the President's Committee of Advisors on Science and Technology and the National Research Council's Space Studies Board. Dr. Ride has been inducted into the National Women's Hall of Fame, the Astronaut Hall of Fame and has received numerous honors and awards, including the Jefferson Award for Public Service, the von Braun Award, and the Lindbergh Eagle.

2005-2: Director's Colloquium by Paul Otellini, President and COO of Intel

On Tuesday, February 22nd at 2:00pm, Mr. Paul Otellini, President and Chief Operating Officer of Intel Corporation, will present a Director's Colloquium entitled "Riding Moore's Law" in the Main Auditorium (N201). All resident staff are cordially invited to attend. A short abstract for his presentation and a bio are given below.

Abstract: Mr. Paul Otellini will discuss the status and future implications of Moore's Law. Potential topics include applications in supercomputing such as NASA's Project Columbia, and a view into the next inflection points in the computing and communications industry.

Bio: As Intel's president and chief operating officer, Paul S. Otellini is responsible for all internal operations. Otellini has been elected to serve as the fifth chief executive officer of Intel, effective in May of 2005, succeeding Craig R. Barrett.

Otellini joined Intel in 1974 and has served as president and COO since 2002, the year he also was elected to Intel's board of directors. From 1998 to 2002, he was executive vice president and general manager of the Intel Architecture Group, responsible for the company's microprocessor and chipset businesses and strategies for desktop, mobile, and enterprise computing. From 1992 to 1998, Otellini served as executive vice president of sales and marketing. Previously, he served as general manager of the Microprocessor Products Group, leading the introduction of the Pentium microprocessor that followed in 1993.

Otellini holds a bachelor's degree in economics from the University of San Francisco and a master's degree from the University of California at Berkeley.

2005-3: Director's Colloquium by Professor Jonathan Dorfan, Director of SLAC

Professor Jonathan Dorfan, Director of Stanford Linear Accelerator Center (SLAC), will present a Director's Colloquium entitled "The New Universe" on Thursday, April 21st, at 2:00pm in the main auditorium (N201). In his talk, he will illustrate the revolutionary new challenges facing particle physics. Recent information from cosmological measurements have shown that over 95% of the universe is dark and that all the matter that has been so precisely studied by physicists in the post-war period represents only 5% of the total mass of the universe. Professor Dorfan will concentrate on three principle questions: What is Dark Matter? What is Dark Energy? and Where is the Anti-matter? He will explain what is being done in High Energy Physics worldwide to address these questions and also what facilities are planned for the future.

Biographical sketch: Dr. Dorfan received his B.S. from the University of Cape Town, South Africa and his Ph. D. in physics from the University of California, Irvine. He has been a Professor at Stanford's Linear Accelerator Center since 1989, and Director of Stanford Linear Accelerator Center since 1999. He is a Fellow of the American Academy of Arts and Sciences and of the American Physical Society. Currently he is the Chair of the International Committee on Future Accelerators and on the Board of the Weizmann Institute of Science. His research interests encompass elementary particle physics and advanced accelerator design.

2005-4: Director's Colloquium by Dr. William Ballhaus

On Thursday, April 28th at 10:00 a.m., Dr. Bill Ballhaus will present a Director's Colloquium in the main auditorium entitled "The Ten Most Important Lessons You Didn't Learn in Engineering School". His talk, which includes two videos, will be both understandable and relevant to the culture changes that were recommended for the Agency by the Columbia Accident Investigation Board (CAIB). Dr. Ballhaus is now the President and CEO of The Aerospace Corporation, an organization widely known as "The Architect of National-Security Space." Aerospace has had a hand in every government launch vehicle and satellite program since 1960, and is heavily involved in helping transform every sector of military space with next-generation systems.

Prior to joining Aerospace in 2000, he had an 11-year career with Lockheed Martin Corporation. At Lockheed Martin Dr. Ballhaus served as corporate officer and vice president, Engineering and Technology. Prior to the merger with Lockheed, Dr. Ballhaus served as president of two Martin Marietta businesses, Aero and Naval Systems, and Civil Space and Communications. He also was vice president and program director of Titan IV Centaur operations at Martin Marietta Space Launch Systems.

Dr. Ballhaus began his career at NASA Ames Research Center as a research scientist in 1971 and rose to become Director of Ames (1984-1989). He also served as acting associate administrator for Aeronautics and Space Technology at NASA Headquarters in Washington, D.C. (1988-1989). Dr. Ballhaus has been elected an honorary fellow of AIAA and was president of AIAA for the 1988-1989 term.

2005-5: Director's Colloquium by Dr. Sylvia Earle

Dr. Sylvia Earle, scientist, explorer, author, oceanographer, diver extraordinaire, entrepreneur, and eternal romantic, will present a Director's Colloquium entitled "Sustainable Seas- the Vision and Reality" on Thursday, May 19 at 2:00 p.m. in the main auditorium (N201). In her talk, Dr. Sylvia Earle will discuss the state of the world's seas, including new techniques for ocean exploration, leading to new policies concerning ocean care. This is a story that everyone should hear, because ignorance about the oceans is the biggest obstacle to their protection.

Dr. Earle received her B.S. from Florida State University and her Ph. D. in botany from Duke University. She is a former chief scientist of the National Oceanic and Atmospheric Administration (NOAA) and a leading American oceanographer. She was among the first underwater explorers to make use of self-contained underwater breathing apparatus (SCUBA) gear and holds many deep diving records, such as the deepest free dive to 1,250 feet. She has been credited with identifying many new species of marine life, has authored many scientific publications, and has written several books including "Sea Change: A Message of the Oceans". She has been a leader in developing and building submersible craft for deep diving, such as "Deep Rover", which can operate to depths of 3000 feet. Currently, she is president and CEO of Deep Ocean Technology and Deep Ocean Engineering in Oakland, California.

Director's Colloquia (2006)

- 2006-1 (2/13/2006) Dr. Bernard Foing
SMART-1 Mission Results and Future Lunar Exploration
- 2006-2 (6/19/2006) Dr. Jeff Kuhn
Measuring the Sun from a small satellite -- microarcsecond astrometry
- 2006-3 (6/27/2006) Jim Benson
Opening the space frontier using small, low-cost missions to Earth orbit and beyond
- 2006-4* (7/20/2006) Dr. Scott Sandford
STARDUST: Returning Samples from Comet Wild-2
- 2006-5 (9/18/06) Jonathan Dowling
The Second Quantum Revolution
- 2006-6* (10/25/2006) Professor Joel Primack/Nancy Abrams
The View from the Center of the Universe
- 2006-7 (10/30/2006) Dr. Hans-Peter Roeser
SOFIA and the Small Satellite Program at the University of Stuttgart
- 2006-8 (11/14/2006) Dr. Dale Cruikshank
Complex Organic Matter on Small Bodies of the Solar System
- 2006-9 (11/16/2006) ISU Strasbourg team
Luna Gaia: A Closed Loop Habitat For The Moon
- 2006-10 (11/17/2006) Professor Roger Angel
What might be done in space to mitigate global warming
- 2006-11 (11/20/2006) Professor Claire Tomlin
Hybrid Control: from Air Traffic to Fly Wings
- 2006-12 (12/12/2006) Professor Dirk Bouwmeester
Optical cooling, nanophotonics, gravitational wave detectors, and spin-polarized ^3He

*Denotes that the colloquium is available on DVD in the library

2006-1: Director's Colloquium by Dr. Bernard Foing

On Monday, February 13th, at 2:00 p.m. in the Space Sciences Auditorium (N245), Dr. Bernard Foing, Chief Scientist of the European Space Agency, will give a Director's Colloquium entitled "SMART-1 Mission Results and Future Lunar Exploration". The European Space Agency's SMART missions- Small Missions for Advanced Research and Technology- are designed to test new spacecraft technology while visiting various places in the solar system. SMART-1 is now at the moon, mapping the surface mineralogy. Dr. Foing will discuss the results of the mission and the implications for future lunar exploration. All Ames staff is cordially invited. Since seating is limited in the Space Sciences Auditorium, please plan on arriving a little early.

Dr. Bernard Foing is currently the Chief Scientist of the European Space Agency. He participates in the SMART-1 mission as Project Scientist. He is also a co-investigator in the Mars Express project and acts as Executive Director of the International Lunar Exploration Working Group (ILEWG). His research interests include lunar exploration, solar-terrestrial relations, solar system history, and spectroscopy.

2006-2: Director's Colloquium by Dr. Jeff Kuhn

Astronomer Jeff Kuhn will present a Director's Colloquium on Monday, June 19th, at 2:00 p.m. in the Space Sciences auditorium (Bldg. N245). The title of his talk is "Measuring the Sun from a small satellite -- microarcsecond astrometry". He will discuss the role of small satellites as space platforms for small aperture solar telescopes, and how they can yield astrometric solar information orders of magnitude more accurate than ground-based instruments. He will discuss progress toward measuring the Sun's shape and size with an accuracy approaching a few microarcseconds.

Dr. Kuhn received his PhD in Physics from Princeton University in 1981. Since then he has worked on a variety of problems, ranging from understanding why the Sun varies to understanding what makes small satellite galaxies of the Milky Way so tenuous. He has worked as an astronomer with the National Optical Observatories in New Mexico and as a Professor of Physics and Astronomy at Michigan State University. He is presently an Astronomer with the Institute of Astronomy at the University of Hawaii. Jeff is presently developing a new type of telescope for Solar observing on the Haleakala volcano in Maui, with hopes of extending these ideas to much larger telescopes for observing a part of the universe that is currently invisible to all other instruments.

2006-3: Director's Colloquium and NRP Lecture by Jim Benson

Jim Benson, Founder, Chairman and CTO of SpaceDev Inc., will be at Ames Research Center on Tuesday, June 27th. He will present two lectures on the topic of opening the space frontier using small, low-cost missions to Earth orbit and beyond. The first lecture will be a Director's Colloquium in the Space Sciences Auditorium of Building N245 at 3:00 p.m. This will be followed by a wine and cheese social from 4:00 - 4:30 p.m. The second lecture is entitled "Revolutionizing Space for ALL Humanity", and will be given as part of the NASA Research Park Exploration Lecture Series at 7:00 p.m in the Eagle Room (Bldg. 943). This lecture is open and free to the public. This will be a somewhat less technical version of the Director's Colloquium lecture.

Mr. Benson and SpaceDev are developing the world's first private sector enterprise to profitably explore and develop space beyond earth orbit. SpaceDev's mission is to help "make space happen" for all of humanity, through the development of a comprehensive private space program, by delivering innovative, affordable, practical and responsive space technologies. Mr. Benson is one of the most successful entrepreneurs in the space development arena. These will be motivation talks showing how the private sector is contributing to Space Exploration. I strongly encourage the staff to attend one of these lectures.

2006-4: Director's Colloquium by Dr. Scott Sandford

On Thursday, July 20, at 2:00 p.m., Dr. Scott Sandford will present a Director's Colloquium in the Main Auditorium (N201) entitled "STARDUST: Returning Samples from Comet Wild-2". This will be followed by an ice cream social in the lobby of Bldg. 200. All of staff is cordially invited to attend. A short abstract and bio are presented below.

On January 2, 2004, the STARDUST spacecraft made a close flyby (236 km) of the nucleus of a comet - Comet Wild 2. During the flyby the spacecraft collected samples of dust from the coma of the comet using aerogel impact collectors. These samples were returned safely to Earth on January 15, 2006 - they represent the first solid sample return since the Apollo era and the first solid sample return ever from outside the Earth-Moon system. Dr. Sandford will discuss the scientific goals of the STARDUST mission, provide an overview of the missions design and flight, and show some of the exciting data returned by the spacecraft during its encounter with the comet. He will also present the details for the recovery, disassembly, and transportation of the Return Capsule when it returned to Earth. Finally, he will provide an overview of the exciting things (some expected, some not) discovered from the returned samples.

Dr. Sandford is a member of Ames' Astrophysics Branch and is a co-leader (with Louis J. Allamandola) of the Ames' Astrochemistry Laboratory. He has extensive experience in the fields of meteoritics. He is an editor of the journal Meteoritics and Planetary Science and has helped find many meteorites in Antarctica. Dr. Sandford also does extensive work in the areas of laboratory astrophysics and astrochemistry, and infrared astronomy (ground-based and air-borne). Current laboratory interests include the study of the physical, chemical, and spectroscopic properties of polycyclic aromatic hydrocarbons and astrophysical ice analogs relevant to interstellar, cometary, and planetary environments. Dr. Sandford is also a Co-Investigator on the STARDUST Discovery Mission.

2006-5: Director's Colloquium by Dr. Jonathan Dowling

On Monday, September 18th, at 1:30 p.m., Dr. Jonathan Dowling will present a Director's Colloquium in the Space Sciences Auditorium (N245) entitled "The Second Quantum Revolution". This will be followed by a cookies and punch reception in the lobby outside the auditorium. All of staff is cordially invited to attend. A short abstract and bio are presented below. Note that the time is 1:30 p.m., instead of the usual 2:00 p.m.

Abstract: We are currently in the midst of a second quantum revolution. The first quantum revolution gave us new rules that govern physical reality. The second quantum revolution will take these rules and use them to develop new technologies. In this review we discuss the principles upon which quantum technology is based and the tools required to develop it. We discuss a number of examples of research programs that could deliver quantum technologies in coming decades including; quantum information technology, quantum electromechanical systems, coherent quantum electronics, quantum optics, and coherent matter technology. NASA applications are to vastly improved quantum computers, quantum communications, quantum sensors, and quantum enhanced global and planetary positioning systems.

Bio: Jonathan P. Dowling is a Horace C. Hearne Jr. Professor of Theoretical Physics and Co-Director the Hearne Institute for Theoretical Physics, Louisiana State University, Baton Rouge, Louisiana. Prof. Dowling received his Ph.D. in mathematical physics from the University of Colorado at Boulder in 1988. He was a a Postdoctoral Research Scientist at the Max Planck Institute for Quantum Optics in Garching, Germany. He was also a National Research Council postdoctoral research associate in the Science & Technology group at Army Aviation and Missile Command (AMCOM), Redstone Arsenal, Alabama, before joining AMCOM as a Research Physicist in 1994. He then left AMCOM to take a position in 1998 as a Research Scientist and Supervisor of the Quantum Computing Technologies Group at NASA JPL. He took up his current post in Louisiana in 2004. Dowling has over 120 published articles and holds eight US patents. He is a Fellow of the Institute of Physics and of the Optical Society of America.

2006-6: Director's Colloquium by Cosmologist Joel Primack and Writer/Philosopher Nancy Ellen Abrams

On Wednesday, October 25th, at 2:00 p.m. in the Main Auditorium (N201), Cosmologist Joel Primack and Writer Philosopher Nancy Ellen Abrams will together present a Director's Colloquium entitled "View from the Center of the Universe" along the lines of their recent book by the same title. Following the colloquium, there will be a wine and cheese reception in the lobby of Bldg. 200.

Abstract: The talk will focus on the new scientific picture of the Universe that has evolved in the last 10-15 years, a Universe which remarkably is thought to contain 70% Dark Energy, 25% Cold Dark Matter, 4% Invisible Atoms, and less than 1% Visible Matter. They will show some of their spectacular videos of colliding galaxies based on calculations and simulations done on Project Columbia. This colloquium should be both understandable and visually spectacular. I highly recommend it.

Bio: Joel Primack is Professor of Physics at the University of California, Santa Cruz. In collaboration with colleagues from astronomy, he developed the "cold dark matter" theory. Currently he has been investigating the implications of various hypotheses regarding the identity of the dark matter for the formation and distribution of galaxies. He also works on science and technology policy. He and his wife, Nancy Ellen Abrams, are exploring the cultural implications of the ongoing revolution in cosmology and co-teach a popular UCSC course on Cosmology and Culture. Nancy Ellen Abrams has a bachelors degree in history and philosophy of science from the University of Chicago, and a law degree from the University of Michigan. She has worked at international law firms, at the Ford Foundation, and for the U.S. Congress.

2006-7: Director's Colloquium by Professor Dr. Hans-Peter Roeser

On Monday, October 30th, at 2:00pm in the Space Sciences Auditorium (N245), Professor Hans-Peter Roeser will present a Director's Colloquium entitled "SOFIA and the Small Satellite Program at the University of Stuttgart". Following the colloquium, there will be a wine and cheese reception just outside the auditorium. All of staff is cordially invited.

Abstract: Dr. Roeser will first discuss the activities and research in the German SOFIA Institute (DSI), which include the management of the German engineering and scientific contributions to the SOFIA operations phase. He will then outline the University of Stuttgart's small satellite program, which consists of a series of four satellites, starting with the "Flying Laptop", to be launched in early 2008 into Low Earth Orbit (LEO). It will be used for remote sensing and as a technology development program to test payloads and subsystems. The second and third small satellite of the series will be test beds for new electrical propulsion systems with a payload to do astronomy, and a re-entry test vehicle, respectively. The fourth small satellite will be named "Lunar Mission BW1". This satellite will have a mass of about 200 kg and a volume of $1 \times 1 \times 1 \text{ m}^3$ to be launched 2010+ as a piggy-back passenger.

Bio: Hans-Peter Roeser received the Diploma in physics in 1976 and the Ph. D. degree in 1979 from the University of Bonn, Germany. From 1974 - 1994 he has been with the Max-Planck-Institute for Radioastronomy in Bonn where he has held a number of positions in the Department of Millimeter and Submilli-meter/FIR Technology. From 1994 - 2002 he was Director of the Institute of Space Sensor Technology at the German Aerospace Center (DLR) in Berlin and Professor at the Technical University of Berlin. Since 2002 he has been a Professor at the University of Stuttgart and Managing Director of the Institute of Space Systems (IRS). His main interest is the development and application of remote sensing instruments in the visible and infrared wavelength range for airborne and space-borne programs.

2006-8: Director's Colloquium by Dr. Dale Cruikshank

On Tuesday, November 14th, at 1:00 p.m. in the Space Sciences Auditorium (N245), Dr. Dale Cruikshank will present a Director's Colloquium entitled "Complex Organic Matter on Small Bodies of the Solar System". Following the colloquium, there will be a cookies and punch reception just outside the auditorium. All of staff is cordially invited. Please arrive early to ensure a seat.

Abstract: Simple carbon-bearing molecules in the solid state have been known as ices on the surfaces of small bodies in the Solar System since the detection of methane on Pluto. From an observational viewpoint such materials tend to impart a color to the surface on which they are present. Early lab work on the synthesis of organic solids by energy deposition in gas and ice mixtures (mostly related to Titan) showed that the production of highly colored solids is straightforward, but that the chemical analysis of the material is not. In addition to recent detections of specific classes of complex hydrocarbons on the satellites of Jupiter and Saturn, more recent laboratory work has begun to illuminate the entire subject of complex organic solids, their origins in the pre-solar cloud, the solar nebula, and on planetary bodies which are currently chemically active. This work underscores the point that together with rock, metal, and ice, organic solids are an essential component of bodies in the Solar System.

Dr. Dale Cruikshank has pioneered the application of infrared spectroscopy to small bodies in the outer Solar System (OSS). His discoveries confirm the conjecture that ices are the dominant component of OSS bodies. With colleagues, he discovered the five ices known on Triton, the three ices known on Pluto, and water ice on four large satellites of Uranus, two satellites of Saturn, Neptune's satellite Nereid, and Pluto's satellite. With colleagues, he was first to find H₂O ice in the Kuiper Belt, and methanol ice on a Centaur that links these bodies to comets. In his colloquium, he will discuss his contributions to planetary science that resulted in his winning the prestigious 2006 Gerard P. Kuiper Prize for Planetary Sciences.

2006-9: Director's Colloquium by Luna Gaia team project members

On Thursday, November 16th, at 3:00pm in the Space Sciences Auditorium (N245), 12 of the Luna Gaia team project members for the Summer Session Program held at the International Space University, Strasbourg in 2006, will present a Director's Colloquium entitled "LUNA GAIA: A CLOSED LOOP HABITAT FOR THE MOON". Following the colloquium, there will be a wine and cheese reception just outside the auditorium. All of staff is cordially invited. Please arrive early to ensure a seat.

Abstract: Luna Gaia posits a pathway to new technologies, philosophies, systems applications and infrastructure aimed at achieving a closed loop habitat model for human settlement on the moon. The framework supports an ideal profile for an optimum of 11 human crewmembers on the lunar surface for a period of 18-36 months. This presentation outlines the recommendations on the overall systems architecture, the engineering processes, as well as the research, development and orchestration of separately phased precursor missions by the year 2030. The Luna Gaia design solution focuses on optimizing the synergy between all regenerative processes of a network of closed loop life support systems. It also details the ethical and philosophical considerations of a lunar settlement and the wider implications for international law, policy and future interplanetary governance. Advancement of earth-based application of these processes are highlighted and strategies for effective information transfer and handling through education, media communication, outreach and advancement of future research.

Bio: Thirty-two (32) authors representing eleven (11) nationalities and almost as many languages worked collaboratively on Luna Gaia as a team project for the Summer Session Program held at the International Space University, Strasbourg in 2006. Working in an interdisciplinary and intercultural environment to produce a comprehensive professional level report, the authors interacted with experts from academia, government and industry. The authors backgrounds range from physical sciences, life sciences, engineering, information technology, business and management, policy & law, arts & humanities, space applications and architecture with over 53% of them possessing masters or doctorate degrees. Luna Gaia was supported by the ISU faculty and teaching support staff and co-chaired by Pete Worden, Alan Weston & William Marshall of the NASA Ames Research Centre. The executive summary and full report are available online at <http://ssp06.isunet.edu/>. Today's presentation will be given jointly by 12 of these 32 authors.

2006-10: Director's Colloquium by Professor Roger Angel

On Friday, November 17th, at 3:00 p.m. in the Space Sciences Auditorium (N245), Professor Roger Angel will present a Director's Colloquium entitled "What might be done in space to mitigate global warming". Following the colloquium, there will be a wine and cheese reception outside the auditorium. All of staff is cordially invited. Please arrive early to ensure a seat.

Abstract: Space could be used both to slow the pace of global warming, and to reverse it if necessary. To hold the increase of atmospheric CO₂ to twice pre-industrial level, it will be necessary to generate most of the world's new electricity without fossil fuel. Solar energy from space could be a major source, if launch costs can be reduced, and if ways to fabricate kilometer scale structures in space are developed. 24-hour power from GEO would be relayed by microwaves to receiving centers spaced 2000 km apart, and could be distributed to all parts by conventional aluminum lines. This avoids the daytime/clear-sky limitation that applies to ground-based solar photovoltaic without a global superconducting grid. If it turns out that dangerous changes in global climate are in store even if all steps are taken to minimize CO₂ increases, then active cooling of the planet to reverse warming should be considered. I show that the minimum mass for an effective sunshade at L1 is 20 million tons. Electromagnetic launch from Earth followed by ion propulsion could get launch cost down to \$50/kg, given such large volume. Assembly in space would be avoided completely by making the sunshade as a cloud of 0.6-m sized autonomous spacecraft weighing 1 gram each, assembled completely on Earth and deployed in a cloud 6000 km in diameter and 100,000 km long.

Dr. Roger Angel received his BA from St. Peter's College, Oxford University, in 1963, his MS from California Institute of Technology in 1966, and his D Phil from Oxford University in 1967. Currently he is the Director of the Steward Observatory Mirror Laboratory, Director of the Center for Astronomical Adaptive Optics, and Regents Professor of Astronomy and Optical Sciences at the University of Arizona. He is a Fellow of the Royal Society and the Royal Astronomical Society, and a member of the American Academy of Arts and Sciences, and the National Academy of Science. His research interests span a wide range of disciplines, including adaptive optics, instrumentation, extrasolar planets, telescope design and optical fabrication, and interferometry.

2006-11: Director's Colloquium by Professor Claire Tomlin

On Monday, November 20th, at 3:00 p.m. in the Main Auditorium (N201), Professor Claire Tomlin, winner of the prestigious 2006 MacArthur Award will present a colloquium entitled "Hybrid Control: from Air Traffic to Fly Wings". Following the colloquium, there will be a wine and cheese reception in the lobby of Bldg. 200. All of staff is cordially invited.

Abstract: Hybrid systems are a suitable model for representing systems that can transition between different behaviors. Many engineered systems are designed to be hybrid in order to simplify function and maintain flexibility in operation. For example, air traffic control systems involve transitions between simple flight modes for multiple aircraft. Hybrid systems are also a good framework for modeling natural systems: in cell biology, the dynamics that govern the spatial and temporal increase or decrease of protein concentration inside a single cell are continuous differential equations derived from biochemistry, yet their activation or deactivation is triggered by transitions which encode protein concentrations reaching given thresholds. In this talk, methods that have been designed to analyze, verify, and control hybrid systems will be presented. The methods use tools from game theory, wavefront propagation, and symbolic predicate abstraction, and rely on an iterative refinement procedure, which computes, either exactly or approximately, regions of the system's operating space in which desired behavior is guaranteed.

Bio: Claire J. Tomlin is an Associate Professor in the Department of Electrical Engineering and Computer Sciences at the University of California at Berkeley, and is an Associate Professor in the Department of Aeronautics and Astronautics at Stanford University, where she also holds the Vance D. and Arlene C. Coffman Faculty Scholarship in the School of Engineering. She received a Ph.D. in Electrical Engineering from the University of California at Berkeley in 1998. She has held visiting research positions at NASA Ames and Honeywell Labs. Claire Tomlin has received many awards, including the highly prestigious MacArthur Fellow Award for 2006. Her research interests are in control systems, specifically hybrid control theory, and she works on air traffic control automation, flight management system analysis and design, and modeling and analysis of biological cell networks.

2006-12: Director's Colloquium by Professor Dirk Bouwmeester

On Tuesday, Dec. 12, at 3:00 p.m. in the Space Sciences Auditorium (N245), Professor Dirk Bouwmeester will present a Director's Colloquium entitled "Optical cooling, nanophotonics, gravitational wave detectors, and spin-polarized ^3He ." The colloquium will be followed by a wine and cheese reception. All of staff is cordially invited.

Abstract: By combining state of the art experimental techniques in solid-state nanofabrication and ultra low temperature physics, it is possible to perform experiments that can span a large range of topics, from solid-state cavity Quantum Electrodynamics (QED) to gravitational wave detection. I will explain how to use optical fields to cool the motion of a tiny mirror from room temperature to 135 mKelvin, how to perform solid-state cavity QED using quantum dots in photonic crystals, how to measure gravitational waves using resonances of solid spheres, and how to produce and investigate spin polarized ^3He .

Bio: Dirk Bouwmeester received his doctorate in physics at the University of Leiden in 1995. Currently, he is an Associate Professor of Physics in the Center for Spintronics and Quantum Computation at the University of California, Santa Barbara. Professor Bouwmeester is an expert in quantum optics and quantum information science. He has been involved in the first experimental demonstration of quantum teleportation, quantum cloning, 3-particle entanglement, and stimulated emission of entangled photons. He has pioneered new ways of studying the properties of microtubules by attaching colloidal quantum dots to biological molecules and observing their optical properties.

Director's Colloquia (2007)

- 2007-1* (1/9/2007) Astronaut Jeff Williams
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- 2007-2 (1/22/2007) Dr. Friedemann Freund
Prospects for an Earthquake Early Warning System
- 2007-3* (1/31/2007) Chris Grech and Steve Rock
New explorations of the USS Macon using advanced marine technology
- 2007-4 (1/31/2007) Dr. Olivier Guyon
The TOPS Mission Concept: Finding planets around nearby stars
- 2007-5 (2/6/2007) Dr. Fred Singer
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- 2007-6* (3/13/2006) Astronaut Tom Jones
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- 2007-7 (4/10/2007) Dr. Paul Bevilaqua
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- 2007-12 (6/13/2007) Dr. Gregory Sloan
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- 2007-14 (6/21/2007) Dr. Ashok Srivastava
Making Predictions at the Edge of Chaos
- 2007-15 (6/26/2007) Dr. Christopher Potter
Studying Global Warming's Impacts and the Uncertain Future of the Biosphere
- 2007-16 (7/10/2007) Dr. David Morrison
Impacts and Evolution
- 2007-17 (7/17/2007) Pete Klupar
Small Spacecraft, What's the Big Deal?
- 2007-18 (7/24/2007) Dr. Banavar Sridhar
Modeling and Optimization in Traffic Flow Management
- 2007-19 (7/31/2007) Dr. Jack Lissauer
Extra Solar Planets
- 2007-20* (8/7/2007) Dr. Scott Sandford
Samples Returned to Earth from Comet 81P/Wild 2 by the Stardust Spacecraft
- 2007-21* (8/14/2007) Dr. Chris McKay
Titan: Rain, storms, lakes and organic goo
- 2007-22* (8/21/2007) Dr. Natalie Cabrol
The High Lakes Project
- 2007-23 (9/18/2007) Phil Sadler and Gene Giacomelli
Conceptual Lunar Habitat and Greenhouse
- 2007-24 (10/24/2007) Dr. Douglas Engelbart
Augmenting Human Intellect
- 2007-25 (11/5/2007) Dr. Percival McCormack
Introduction to Nanobiology
- 2007-26* (11/16/2007) Dr. George Donohue
Air Transportation: A Tale of Prisoners, Sheep and Autocrats
- 2007-27* (11/27/2007) Dr. Marcia McNutt
Ocean Exploration for the 21st Century
- 2007-28* (12/5/2007) Dr. Marty Hoffert
Electricity from Orbit: The case for R & D

*Denotes that the colloquium is available on DVD in the library

2007-1: Director's Colloquium by Astronaut Jeff Williams

On Tuesday, January 9th, at 10:00 a.m. in the Main Auditorium (N201), Astronaut Jeff Williams will present a colloquium entitled "Expedition 13 Debrief". Astronaut Jeff Williams is the Expedition 13 Flight Engineer and Science Officer. All of staff is cordially invited.

Abstract: Jeff Williams was the Expedition 13 Flight Engineer and Science Officer aboard the ISS. The Expedition 13 crew was launched on March 29, 2006 on the Russian Soyuz TMA 8 from Baikonur, Kazakhstan, docking with the station on March 31, 2006. During 6-months tour of duty aboard the International Space Station, in addition to station maintenance and some science activities, Williams performed two successful spacewalks, logging 12 hours and 25 minutes of EVA wearing both Russian and U.S. spacesuits. He also saw the arrival of two space shuttle missions, the resumption of construction of the orbiting laboratory, and the restoration of a three-person crew. The Expedition 13 mission concluded on September 28, 2006 with a safe landing in the steppes of Kazakhstan.

Bibliography: Williams received a bachelor of science degree in applied science and engineering from the U.S. Military Academy in 1980; a master of science degree in aeronautical engineering and the degree of aeronautical engineer from the U.S. Naval Postgraduate School, both in 1987; and a master of arts degree in national security and strategic studies from the U.S. Naval War College in 1996. He was selected to the NASA astronaut corps in 1996. In addition to Expedition 13, Williams flew aboard STS-101 Atlantis (May 19-29, 2000), the third Shuttle mission devoted to ISS construction. The Ames experiments Williams worked on were launched aboard STS-121 on July 4, 2006. FIT (Fungal Pathogenesis, Tumorigenesis and Effects of Host Immunity in Space) examined the effects of space on the immune systems of fruit flies. Tropi flew plants to study how astronauts might grow food more efficiently in space in the future.

2007-2: Director's Colloquium by Dr. Friedemann Freund

On Monday, January 22nd, at 2:30 p.m. in the Space Sciences Auditorium (N245), Dr. Friedemann Freund will present a Director's Colloquium entitled "Physics of Pre-Earthquake Signals." The colloquium will be followed by a wine and cheese reception. All of staff is cordially invited.

Abstract: The "Holy Grail" of all earthquake research is to predict - within limits as narrow as possible - time, place and magnitude of major events. Seismologists build 30-year probability models principally based on the history of past earthquakes. However, one can greatly improve earthquake forecasting by taking into account the wide variety of pre-earthquake signals detectable from space and on the ground. Until now, the basic physics underlying the generation of these pre-earthquake signals was not understood. We recently discovered that stressed rocks turn into batteries, and that powerful electric currents can flow out of such rocks. Physically, the stress activates a specific type of dormant electronic charge carriers (associated with point defects). These charge carriers are defect electrons in the oxygen anion sublattice. They are positive holes (or pholes for short) representing O-/O²⁻ valence fluctuations. We furthermore show that these phole currents are the key element for explaining pre-earthquake signals: they can account for ionospheric perturbations, enhanced IR emission from the ground, and low frequency EM emissions. Finally, phole currents may also provide an explanation for the magnetic signature around impact craters on the moon and on Mars.

Bio: Dr. Friedemann Freund received his Ph.D. at Marburg University in Germany in Mineralogy/Crystallography. Prior to coming to Ames, he was Assistant Professor of Chemistry at the University of Göttingen, Germany (1962-1969), and Professor of Geosciences at the University of Cologne, Germany (1970-1987). He is currently a Principal Investigator in the Carl-Sagan Center, SETI Institute, and Adjunct Professor in the Physics Department at San Jose State University. In addition to rock physics in relation to earthquake and pre-earthquake phenomena, his research interests include defects in minerals and crystals, proton conductivity, prebiotic chemistry in the solid state, and the origin of Life.

2007-3: Director's Colloquium by Chris Grech and Steve Rock

On Wednesday, Jan. 31, from 2:00 p.m. to 3:30 p.m., in the Main Auditorium (N201), Chris Grech and Steve Rock will present a Director's Colloquium titled "New explorations of the USS Macon using advanced marine technology."

In September 2006, researchers from NOAA's National Marine Sanctuary program and the Monterey Bay Aquarium Research Institute in Moss Landing (MBARI) led an archeological expedition off the Big Sur coast at the submerged wreck site of the rigid airship USS Macon. The Macon crashed on Feb. 12, 1935 as it headed back to its home base, in Hangar One at Moffett Field.

Chris Grech, leader of the expedition to the Macon, will give an overview of the expedition and display the stunning images they collected. Steve Rock will then focus on the methods used to control the remotely operated underwater vehicle Tiburon as they compiled a mosaic portrait of the debris field. The expedition earned much public attention. This talk will appeal to those interested in the aviation history of Moffett Field, in the state-of-the-art in underwater robotics, and in technology useful in unmanned vehicles.

Chris Grech is deputy director of marine operations at MBARI. Stephen Rock is a professor in the aeronautics and astronautics department of Stanford University and director of the Aerospace Robotics Laboratory. His research includes advanced control and modeling techniques for robotic and vehicle systems (aerospace and underwater).

This talk is co-organized by the NASA Ames History Office. More information about the expedition can be found at: http://www.mbari.org/news/news_releases/2006/macon.html and <http://montereybay.noaa.gov/research/macon/2006.html>

2007-4: Director's Colloquium by Dr. Olivier Guyon

On Thursday, February 8th, at 10:00 a.m. in the Space Sciences Auditorium (N245), Dr. Olivier Guyon will present a Director's Colloquium entitled "The TOPS Mission Concept: Finding planets around nearby stars". The colloquium will be followed by a cookies and punch reception. All of staff is cordially invited.

Abstract: Dr. Guyon will explain the scientific potential and the technical challenges of the Telescope to Observe Planetary Systems (TOPS) mission concept, including describing what sorts of planets TOPS can detect around nearby stars. He will also focus on the extremely stringent mission requirement of rejecting all but 1 part in 10 billion of the light from a planet's parent star. Dr. Guyon will explain how the Phase Induced Apodization Coronagraph that he invented will achieve this very tight requirement as well as other aspects of the TOPS mission concept.

Bio: Dr. Olivier Guyon received his Ph.D. in physics from the University of Paris in 2002. He is currently an astronomer at the Subaru Telescope in Hawaii. He is a leading world expert in adaptive optics and the design and fabrication of optical coronagraphs for use in high contrast imaging with astronomical telescopes. Dr. Guyon was the Principal Investigator of the TOPS proposal he recently submitted to the NASA Discovery Program with Ames as a partner.

2007-5: Director's Colloquium by Dr. Fred Singer

On Tuesday, February 6, at 2:00 p.m. in the Space Sciences Auditorium (N245), Dr. Fred Singer will present a Director's Colloquium entitled "Phobos and Deimos: Science and Missions." The colloquium will be followed by a wine and cheese reception. All staff is cordially invited to attend.

Abstract: What is the origin of the Martian moons and what can they tell us about the planet's early history? A manned mission, using the moons as a base, may be the most cost-effective way to explore these scientific questions in the near term. There seem to be no show-stoppers, but certain technical issues must be addressed to minimize costs and maximize benefits.

Bio: S. Fred Singer, professor (emeritus) of environmental sciences at the University of Virginia, is the founding president of the Arlington (VA)-based Science & Environmental Policy Project (SEPP). SEPP is a non-profit, educational association of scientists concerned with providing a sound scientific base for environmental policies. Singer has held several academic and governmental positions, including as the first director of the US Weather Satellite Service (now part of NOAA), deputy assistant administrator for policy of the Environmental Protection Agency, and most recently, chief scientist of the US Department of Transportation. In addition to atmospheric and climate issues, his research publications cover a wide range of planetary problems, including the Earth's ionosphere, magnetosphere, and exosphere, and the origins of the Moon and satellites of Mars.

2007-6: Director's Colloquium by Astronaut Tom Jones

On Tuesday, March 13, at 10:00 a.m., Astronaut Tom Jones will present a Director's Colloquium in the Main Auditorium (N201) entitled "Sky Walking: Human Space Exploration in the 21st Century." All of staff is cordially invited to attend. A short abstract and bio are presented below.

Abstract: Planetary scientist and veteran shuttle astronaut Tom Jones will discuss his new book, "Sky Walking: An Astronaut's Memoir," which details his experiences as mission specialist and payload commander aboard four space shuttle flights. Jones worked in orbit with payloads like the Space Radar Lab, deployable scientific satellites, and the planning and construction of the International Space Station. Dr. Jones will address our current direction in human space exploration and discuss the scientific and practical advantages (and shortcomings) of returning to the Moon and using the near-Earth asteroids as stepping-stones on the way to Mars.

Bio: Born and raised in Maryland, Tom Jones was a Distinguished Graduate of the United States Air Force Academy. During his career, he has piloted B-52s, earned a doctorate in planetary science from the University of Arizona, and worked for the Central Intelligence Agency. He entered the NASA astronaut program in 1990 and flew four missions on the space shuttle.

Dr. Jones's awards include the NASA Distinguished Service Medal, four NASA Space Flight Medals, the NASA Exceptional Service Award, and the NASA Outstanding Leadership Medal. A consultant, author, and scientist, he is active in the debate over the nation's future in space, and serves on the NASA Advisory Council. His Web site is www.AstronautTomJones.com.

2007-7: Director's Colloquium by Dr. Paul Bevilaqua

On Tuesday, April 10, at 2:00 p.m., Dr. Paul Bevilaqua will present a Director's Colloquium in the Space Sciences Auditorium (N245) entitled "Inventing the Joint Strike Fighter." A wine and cheese reception will take place directly after the colloquium. A short abstract and bio are presented below. All of staff is cordially invited to attend.

Abstract: A Team led by Lockheed Martin recently won the contract to develop the F-35 Joint Strike Fighter (JSF), one aircraft that will be built in conventional, naval and VSTOL variants. The key to developing this family of aircraft is a new dual-cycle propulsion system, which can be switched from a turbofan cycle to a turboshaft cycle to increase thrust. This presentation will discuss the JSF competition and the development of this innovative airplane, and describe the Skunk Works approach to innovation and how it evolved to incorporate advances in Computer-Aided Engineering.

Biography: Dr. Paul Bevilaqua has spent much of his career developing Vertical Take Off and Landing aircraft. Bevilaqua joined Lockheed Martin as Chief Aeronautical Scientist of the Lockheed Advanced Aeronautics Company, and became Chief Engineer of Advanced Development Projects in the Lockheed Martin Skunk Works. During this time, he played a leading role in creating the Joint Strike Fighter Program. Bevilaqua invented the Lift Fan Propulsion System that made it possible to build a stealthy, supersonic Vertical Take Off and Landing aircraft, and led the engineering team that demonstrated the feasibility of building conventional and VTOL variants of this aircraft for the US Air Force and Marines, and the British Royal Navy. Prior to joining Lockheed Martin, Bevilaqua was Manager of Advanced Programs at Rockwell International's Navy aircraft plant, where he led teams designing VTOL interceptor and transport aircraft. He began his career as a Captain in the US Air Force and Deputy Director of the Energy Conversion Laboratory at Wright Patterson Air Force Base. Bevilaqua has a BS in Aerospace Engineering from the University of Notre Dame, and MS and PhD degrees in Aeronautics and Astronautics from Purdue University.

2007-8: Director's Colloquium by Robyn Beavers

On Thursday, May 3 at 1:00 p.m. in the main auditorium (N-201), Robyn Beavers, who is the Corporate Environmental Programs Manager at Google, will discuss Google's installation of 1.6 megawatts of solar photovoltaic panels at their Mountain View campus. This project is the largest solar installation on any corporate campus in the U.S to date. The panels will cover the roofs of the four main buildings of the Googleplex, and also those of two additional buildings across the street. There will also be a portion of this installation on new solar panel support structures in a few parking lots. The amount of electricity that will be generated is equivalent to powering about 1,000 average California homes. Google will use the electricity generated to power several of their Mountain View office facilities, offsetting approximately 30 percent of their peak electricity consumption at those buildings.

Following her colloquium, we will have a panel discussion. The panelists will include Robyn Beavers (Google), Steve Frankel, who will discuss the effort to install solar panels at Ames, and Stephanie Langhoff, Walt Brooks, and Scott Sandford, who will discuss their experiences with the installation of solar panels on their homes. Steve Hipskind, Chief of the Earth Sciences Division, will MC the event. Following the panel discussion, there will be a reception in the lobby of Building 200. All of the staff is cordially invited to attend. Come find out about one mechanism for reducing your carbon usage and help make the world "greener."

2007-9: Director's Colloquium by Nobel Laureate, John Mather

I am very pleased and honored to welcome Nobel Laureate, John Mather, to the Ames Research Center. On Wednesday, May 9, at 2:00 p.m. in the main auditorium (N201), Dr. Mather will present a Director's Colloquium entitled, "From the Big Bang to the Nobel Prize and Beyond." This is a unique opportunity to learn about the Hot Big Bang theory of the Universe and about the future of astronomy from one of the world's leading experts. An abstract and bio are given below. The colloquium will be followed by a wine and cheese reception in the lobby of Building 200. All the Ames community is cordially invited to attend. I look forward to seeing you there!

Abstract: The Cosmic Background Explorer (COBE) satellite, proposed in 1974 and launched by NASA in 1989, measured the cosmic microwave and infrared background radiation from the Big Bang and everything that happened later. The COBE team made three key measurements: the spectrum of the cosmic microwave background radiation (CMBR) matches a blackbody within 50 ppm, the CMBR is anisotropic, with 10 ppm variations on a 7 degree angular scale, and the cosmic infrared background from previously unknown objects is as bright as all the known classes of galaxies. The first measurement confirmed the Hot Big Bang theory with unprecedented accuracy, the second is interpreted as representing quantum mechanical fluctuations in the primordial soup and the seeds of cosmic structure and the basis for the existence of galaxies, and the third is still not fully understood. I will describe the project history, the team members, the hardware and data processing, the major results, and their implications for science, and end with the outlook for future progress with new background measurements and large telescopes such as the James Webb Space Telescope.

Bio: Dr. Mather is currently serving as Chief Scientist in the Science Mission Directorate at NASA Headquarters. He comes to Headquarters from the NASA Goddard Space Flight Center where he was a senior astrophysicist and adjunct professor of physics at the University of Maryland. He was awarded the 2006 Nobel Prize in Physics, shared with George F. Smoot for "their discovery of the black body form and anisotropy of the cosmic microwave background radiation". This work helped cement the big-bang theory of the universe using the COBE satellite. Dr. Mather joined the Goddard Space Flight Center in Greenbelt, Maryland to head the Cosmic Background Explorer (COBE) Mission as Project Scientist. He has been a Goddard Fellow since 1994 and currently serves as Senior Project Scientist and Chair of the Science Working Group of the James Webb Space Telescope (JWST) Mission.

2007-10: Director's Colloquium by SpaceShipOne Test Pilot, Douglas Shane

On Wednesday, June 6, at 2:00 p.m. in the Ballroom of the Ames Training and Conference Center (Building 3), Douglas Shane, SpaceShipOne Test Pilot and Flight Controller on the Ansari X Prize winning flight, will present a Director's Colloquium entitled "Risk Management in the Deep End of the Pool- Winning the X-Prize." The colloquium will be followed by a wine and cheese reception in the Showroom of Building 3. All of staff is cordially invited to attend. An abstract and bio follow.

Abstract: In 2004, Scaled Composites won the Ansari X-Prize for flying two flights with the equivalent payload of 3 people, above 100 km altitude twice within two weeks. This required developing a total vehicle system, including a launch aircraft, the SpaceShipOne vehicle, hybrid rocket propulsion, avionics, a simulator, and significant support infrastructure. For a company that had previously been as high as 63,000 ft and .72 Mach, the program requirements of 328,000 ft and 3.2 Mach were considerable corporate envelope expansions. This presentation will describe the origins of the SpaceShipOne program, design considerations, ground testing, crew training, and flight test results.

Bio: Doug Shane is Vice President/Business Development, Director of Flight Operations and Test Pilot for Scaled Composites. He has 21 years experience in aircraft flight test, design, program management, and business development, with particular expertise in research aircraft developmental flight testing. He has been the Flight Operations Director at Scaled Composites since 1989, and has been directly responsible for the safe performance of more than 25 research flight test programs. Shane holds a Bachelor of Science in Aerospace Engineering from the University of Kansas, Lawrence, KS, 1982.

2007-11: Director's Colloquium by Professor David Atkinson

On Thursday, June 7, at 3:00 p.m. in the Space Sciences Auditorium (N-245), David Atkinson, Professor of Electrical Engineering at the University of Idaho, will present a Director's Colloquium entitled "The Galileo and Cassini-Huygens Heritage - Multiprobes to Saturn." The colloquium will be followed by a wine and cheese reception in the lobby. All of staff is cordially invited to attend. An abstract and bio follow.

Abstract: The success and experience gained from the Galileo probe mission to Jupiter and the recent Huygens probe mission to Titan form the foundation on which plans for future outer planetary probe missions will be developed. To complement the upcoming NASA Juno mission to Jupiter, and to complete the initial survey of the Gas Giants, a Saturn multi-probe mission is currently being considered by both the European and the U.S. planetary communities. Such a mission would most likely comprise a NASA-built carrier flyby spacecraft and two ESA-built Galileo-class entry and descent probes, with a goal of reaching 10 bars with each probe. In this talk I will talk about the legacy of Galileo and Huygens, and the implications for a future Saturn multi-probe mission.

Bio: Dr. David Atkinson is a Professor of Electrical Engineering at the University of Idaho. Atkinson has been a principle or co-investigator on more than 10 NASA-funded projects, both research and educational. He is currently a co-investigator on the NASA/ESA (European Space Agency) Cassini/Huygens Doppler Wind Experiment that successfully measured the winds in the atmosphere of Titan (the largest moon of Saturn) in 2005, and is the Chair of the European Space Agency Huygens Probe Descent Trajectory Working Group. Atkinson received a master's degree in applied physics from Stanford University in 1981, and a Ph.D. in electrical engineering from Washington State University in 1989. Atkinson is currently a participating member on NASA and European Space Agency teams studying a future NASA/ESA multiprobe mission to Saturn, and a combined mission to Saturn's moons Titan and Enceladus.

2007-12: Director's Colloquium by Dr. Gregory Sloan

On Wednesday, June 13, 2007, Dr. Gregory C. Sloan, Research Astronomer at Cornell University, will present a colloquium at 3:30 p.m. in the N-245 Auditorium entitled "Spitzer spectroscopy of unusual hydrocarbons in cool environments." All staff are cordially invited to attend.

Abstract: Polycyclic aromatic hydrocarbons (PAHs) produce an easily recognized infrared spectrum. The Infrared Spectrograph on the Spitzer Space Telescope has observed PAH-like spectra in several objects cooler than those usually associated with PAH emission. These spectra show emission features shifted to longer wavelengths than typical PAHs, and these shifts are consistent with laboratory spectra of hydrocarbon mixtures with both aliphatic and aromatic material. The aliphatic bonds surviving in these cool radiation fields would be stripped in harsher environments. The presence of these bonds may be a clue about the nature of interstellar hydrocarbons in more shielded regions.

Bio: Dr. Gregory Sloan received his Ph.D. in Physics from the University of Wyoming in 1992 and his B.A. in Physics and Astronomy from Northwestern University in 1985. He was a research astronomer, at Cornell University -- Primarily responsible for the calibration of the Infrared Spectrometer on the Spitzer Space Telescope. Conducting extensive research on disks around young stars, mass loss from stars in Local Group galaxies, brown dwarfs, and cool stellar atmospheres.

Greg was an NRC Research Council Associate at Ames, studying deviations from spherical symmetry in dust shells around evolved stars using mid-infrared imaging and polycyclic aromatic hydrocarbons (PAHs) in extended sources using narrow-band imaging and long-slit spectroscopy. His research interests include infrared spectroscopy of circumstellar dust in shells and disks, polycyclic aromatic hydrocarbons (PAHs), related carbon-rich dust, and infrared properties of cool stellar and sub-stellar atmospheres.

His awards include Spitzer Space Telescope observing awards, National Science Foundation International Research Fellowship, National Research Council Fellowship, and Geophysics and Phillips Laboratory Scholar Fellowships.

2007-13: Director's Colloquium by Dr. William Warmbrodt

On Thursday, June 14, at 3:00 p.m. in the Space Sciences Auditorium (N-245), Dr. William Warmbrodt, Chief of the Aeromechanics Branch at Ames, will present a Director's Colloquium entitled "Rotorcraft Research, Development, Test and Evaluation Capability in the National Full-Scale Aerodynamic Complex." This is the first in a series of ten colloquia in the Director's Colloquium Summer Series. The colloquium will be followed by a punch and cookies reception in the lobby. All of staff, but especially our resident summer students, are cordially invited to attend. Seating is limited so please arrive on time. A short abstract and bio follow.

Abstract: The colloquium provides a comprehensive summary of the unique national role the National Full-Scale Aerodynamic Complex (NFAC) plays in rotary wing technology development. The seminar will include the justification for large/full-scale testing, unique NFAC facility capabilities, past examples of NFAC contributions to rotorcraft technology, the unique NFAC rotor test stands, and current R&D projects and plans.

Bio: Dr. William (Bill) Warmbrodt received his PhD in engineering from the University of California at Los Angeles. He has been at Ames since 1978 and since 1985 he has served as Branch Chief of the Aeromechanics Branch. During this time he has initiated and implemented various major Army/NASA rotorcraft aeromechanics research programs. He has also advocated and implemented national research facility developments such as the Tilt Rotor Aeroacoustics Model program, the NFAC Large Rotor Test Apparatus, and others representing approximately \$50M NASA investment in rotor research systems. He has been a subject matter expert to the U.S. Navy Program Office, the U.S. Air Force Helicopter Brownout Team, and various Defense Agency Research Projects programs.

2007-14: Director's Colloquium by Dr. Ashok Srivastava

On Thursday, June 21, at 3:00 p.m. in the Space Sciences Auditorium (N-245), Dr. Ashok Srivastava, Group Leader of the Intelligent Data Understanding (data mining) group at Ames, will present a Director's Colloquium entitled "Making Predictions at the Edge of Chaos." This is the second in a series of ten colloquia in the Director's Colloquium summer series. The colloquium will be followed by a punch and cookies reception in the lobby. All of staff, but especially our resident summer students, are cordially invited to attend. Seating is limited so please arrive on time. A short abstract and bio follow.

Abstract: Making predictions about the future behavior of a system is a critical need for a large number of problems in science and industry. Significant work in a number of disciplines, including statistics, physics, machine learning, and data mining has gone into developing algorithms and a mathematical theory for prediction problems. This talk overviews some of these ideas and discusses some recent advances in data mining that attempt to make predictions on systems that exhibit chaotic behavior. Some applications of these algorithms to NASA missions will also be presented.

Bio: Ashok N. Srivastava, Ph.D. is the Principal Investigator of the Integrated Vehicle Health Management Project at NASA. He is also the Group Leader of the Intelligent Data Understanding (data mining) group at NASA Ames Research Center. The group performs research and development of advanced machine learning and data mining algorithms in support of NASA missions. Some current activities include key NASA challenges such as improving aviation safety, development of new technologies to improve the safety of next generation propulsion systems, studies in the earth sciences to understand climate change, and studies in astrophysics regarding the large-scale structure of the universe. Ashok was recently awarded the NASA Exceptional Achievement Medal for outstanding technical achievements in data mining.

2007-15: Director's Colloquium by Dr. Christopher Potter

On Tuesday, June 26, at 2:00 p.m. in the Space Sciences Auditorium (N-245), Dr. Christopher Potter, a senior research scientist in the Earth Science Division, will present a Director's Colloquium entitled "Studying Global Warming's Impacts and the Uncertain Future of the Biosphere." This is the third in a series of ten colloquia in the Director's Colloquium Summer Series. The colloquium will be followed by a punch and cookies reception in the lobby. All of staff, but especially our resident summer students, are cordially invited to attend. Seating is limited so please arrive on time. A short abstract and bio follow.

Abstract: The world's scientific community is warning that increasing amounts of carbon dioxide (CO₂) in the atmosphere from burning of fossil fuels and other bio mass sources is raising Earth's surface air temperatures. Although efforts are underway at both international and local levels to slow the rate of CO₂ emissions from industrial sources of air pollution, scientists generally agree that our atmosphere will continue to warm significantly for over a century. This talk summarizes the scientific evidence for past, present, and future changes in Earth's biosphere related to global warming. Applications of satellite data analysis and computer simulation modeling at NASA Ames to climate impact studies will also be presented.

Bio: Dr. Christopher Potter is a senior research scientist in the Biospheric Science and Technology Branch at NASA Ames. He holds a Ph.D. and a master's degree in forest ecology from Emory University. He came to NASA Ames in 1990 as a National Research Council (NRC) Associate Fellow. Potter and his colleagues were awarded NASA's Public Service Medal for development of the first computer model for global ecosystem exchange of all major bio-genic trace gases with the atmosphere. He is the author of over 60 peer-reviewed journal articles and book chapters. In 2007, Potter was selected as a NASA Ames Associate Fellow in recognition of exceptional scientific research achievement.

2007-16: Director's Colloquium by Dr. David Morrison

On Tuesday, July 10th, at 2:00 pm in the Space Sciences Auditorium (N-245), Dr. David Morrison, a Senior Scientist at the NASA Astrobiology Institute, will present a Director's Colloquium entitled "Impacts and Evolution". This is the fourth in a series of ten colloquia in the Director's Colloquium Summer Series. The colloquium will be followed by a punch and cookies reception in the lobby. All of staff, but especially our resident summer students, are cordially invited to attend. We expect a full house, so arrive on time to ensure a seat. Note that there is no colloquium on July 3rd due to the 4th of July holiday. A short abstract and bio follow.

Abstract: The Earth orbits the Sun within a swarm of small asteroids. Collisions with our planet over 4.5 billion years have influenced the evolution of life, perhaps profoundly. Were it not for the end-Cretaceous impact of a 15-km asteroid, we would not be here. Consideration of the role of rare but catastrophic mass extinctions introduces a dynamic to evolution that complements the "classical" slow Darwinian change. Impacts are important for our future as well as our past. In the last two decades we have learned not only how to evaluate the impact hazard but also how to mitigate it. The astronomers operating the Spaceguard Survey of Near Earth Asteroids have already reduced the risk of fatality from unknown asteroids by at least 75%, and we have the capability (unlike other natural hazards) of removing most of the impact risk within the next generation.

Bio: David Morrison is the Senior Scientist at the NASA Astrobiology Institute and is a former Director of Space at NASA Ames. Dr. Morrison is the author of more than 155 technical papers and has published a dozen books. He is recipient of the Dryden Medal for research of the American Institute of Aeronautics and Astronautics, the Sagan Medal of the American Astronomical Society for public communication, and the Klumpke-Roberts award of the Astronomical Society of the Pacific for contributions to science education. Morrison was a founder of the multidisciplinary field of astrobiology, and he has provided international leadership since 1992 in defining the hazard of asteroid impacts and seeking ways to mitigate this risk. Asteroid 2410 Morrison is named in his honor.

2007-17: Director's Colloquium by Pete Klupar

On Tuesday, July 17, at 2:00 p.m., in the main auditorium (N-201). Pete Klupar will present a Director's Colloquium entitled "small Spacecraft, What's the Big Deal?" This is the fifth in a series of 10 colloquia in the Director's Colloquium Summer Series. The colloquium will be followed by a punch and cookies reception in the lobby of Bldg. N-200. All of staff, but especially our resident summer students, are cordially invited to attend. A short abstract and bio follow.

Abstract: Mr. Klupar will discuss the evolution of small spacecraft from the dawn of the space age through today. He will provide a review of the perceived strengths and weakness of small spacecraft. The use of small and even nano spacecraft for space science missions is a major growth area for NASA Ames. His talk will provide an over view of the current research activities taking place here.

Bio: Mr. Klupar has worked in the aerospace industry for more than 27 years. He spent 21 years in commercial industry working for Hughes Aircraft, Hughes Helicopter and Spectrum Astro. Where he was exposed to the production of sophisticated aerospace platforms. He was worked in the government service in research and development for the last six years. Previously to his NASA employment, he worked for the U.S. Air Force at the Research Laboratory in Albuquerque. He has been involved in over 40 space flight missions. He has a MBA and a BSME.

2007-18: Director's Colloquium by Banavar Sridhar

On Tuesday, July 24, at 2 p.m. in the Main Auditorium (N-201), Dr. Banavar Sridhar will present a Director's Colloquium entitled "Modeling and Optimization in Traffic Flow Management." This is the sixth in a series of 10 colloquia in the Director's Colloquium Summer Series. All staff, but especially our resident summer students, are cordially invited to attend. A short abstract and bio follow.

Abstract: A safe and efficient aviation industry is vital to the global economy. The growing traffic demand, rise in oil prices, delays in building new runways and security issues are putting pressures on the system to evolve from the current procedure-based, human-centered system to a more flexible system with higher levels of automation. Traffic Flow Management (TFM) is the efficient organization of traffic flows to meet demand taking into account capacity constraints at airports and in en route airspace. TFM involves thousands of aircraft and several layers of decision-makers scattered between the FAA, airlines and other users of airspace. Several types of uncertainties are pervasive in the system. This talk explores the complexity and richness of the problems in TFM by considering research in three different areas: (a) Aggregate Models for TFM, (b) Relationship between weather, traffic and delay and (c) Optimization. Current approaches towards finding best solutions to these problems are discussed.

Bio: Banavar Sridhar received the B.E. degree in electrical engineering from the Indian Institute of Science and the M.S. and Ph.D. in electrical engineering from the University of Connecticut. Currently, he serves as Chief, Automation Concepts Branch managing research activities in Next Generation Air Transportation Technologies. His research interests are in the application of modeling and optimization techniques to aerospace systems. Dr. Sridhar received the 2004 IEEE Control System Technology Award for his contributions to the development of modeling and simulation techniques for multi-vehicle traffic networks and advanced air traffic system. He led the development of traffic flow management software, Future ATM Concepts Evaluation Tool (FACET), which received the NASA Software of the Year Award in 2006. He is a Fellow of the IEEE and the AIAA.

2007-19: Director's Colloquium by Jack Lissauer

On Tuesday, July 31, at 2 p.m., in the main auditorium (N-201), Dr. Jack Lissauer will present a Director's Colloquium entitled 'Extra Solar Planets.' This is the seventh in a series of 10 colloquia in the Director's Colloquium Summer Series. All staff, but especially our resident summer students, are cordially invited to attend. A short abstract and bio follow.

Abstract: The first extra solar planets were discovered in 1991, and 250 are now known. Because planets are much fainter than the stars that they orbit, extra solar planets are extremely difficult to detect directly. By far the most successful technique for finding and studying extra solar planets has been the radial velocity method, which measures the response of host stars to gravitational tugs by their planets. Radial velocity measurements constrain the masses and orbits of extra solar planets. A complementary technique is transit photometry, which measures drops in starlight caused by those planets that periodically pass between their stars and the telescope; transit observations reveal the sizes of planets as well as their orbital periods.

About 7 percent of stars surveyed have planets at least 100 times as massive as the Earth with orbital periods of a few years or less. Roughly 1 percent of stars have such giant planets in very close orbits, with periods of less than one week. Some of these planets seem to be distended in size as a result of heating by their stars. The majority of extra solar planets with orbital periods longer than two weeks have quite eccentric (elongated) orbits. Stars that contain more heavy elements are more likely to possess detectable planets, as are more massive stars. Many extra solar planets orbit stars that are members of binary star systems, and it is common for stars with one detectable planet to have others.

Bio: Jack Lissauer is a space scientist in the Planetary Systems Branch NASA Ames. His primary research interests are the formation of planetary systems, detection of extra solar planets, planetary dynamics and chaos, planetary ring systems, and circumstellar/protoplanetary disks. Dr. Lissauer is co-discoverer of the first four planets known to orbit about faint M dwarf stars, and also co-discovered two faint outer rings and two small inner moons of the planet Uranus. Dr. Lissauer is the co-author of the graduate level textbook Planetary Sciences and a co-investigator on NASA's Kepler Mission. Dr. Lissauer was awarded an Alfred P. Sloan Foundation fellowship, the 1992 Harold C. Urey Prize of the Division of Planetary Sciences of the American Astronomical Society, a 2006 SpotBeam Award from the California Space Authority, and was named an Ames Associate Fellow by NASA Ames in 2007.

2007-20: Director's Colloquium by Scott Sandford

On Tuesday, Aug. 7, at 2 p.m. in the main auditorium (N-201), Dr. Scott Sandford will present a Director's Colloquium entitled "Samples Returned to Earth from Comet 81P/Wild 2 by the Stardust Spacecraft." This is the eighth in a series of 10 colloquia in the Director's Colloquium Summer Series. All of staff, but especially the center's resident summer students, are cordially invited to attend. This is an opportunity to learn about comets, which tell us much about the early solar system. A short abstract and bio follow.

Abstract: On Jan. 15, 2006, the Stardust spacecraft completed a 2.88 billion mile, seven-year round trip journey during which it captured material from a comet (81P/Wild 2) and returned it to Earth for study. This is the first solid sample return from outside the Earth-moon system in history. The talk will provide an overview of the Stardust mission, describe the fascinating materials that were returned from Comet 81P/Wild 2 and discuss the new insights these samples provide into the formation of our solar system.

Bio: Dr. Sandford is a member of Ames' Astrophysics Branch and Ames' Astrochemistry Laboratory (visit <http://www.astrochem.org/> for more information). He has extensive experience in the fields of meteoritics. He is an editor of the journal *Meteoritics and Planetary Science* and has helped find many meteorites in Antarctica. Dr. Sandford also does extensive work in the areas of laboratory astrophysics, astrochemistry, and astrobiology, and participates in infrared astronomy studies using ground-based, airborne and spaceborne observatories. Current laboratory interests include the study of the physical, chemical and spectroscopic properties of polycyclic aromatic hydrocarbons (PAHs) and astrophysical ice analogs relevant to interstellar, cometary and planetary environments.

Dr. Sandford is the principal investigator on the AstroBiology Explorer (ABE) (visit <http://www.astrochem.org/abe.html> for more information) MIDEX Mission concept, a cryogenically cooled infrared telescope that will measure the infrared spectra of a wide variety of objects and environments in space. He is also a co-investigator on the STARDUST Comet Sample Return Discovery Mission (see <http://stardust.jpl.nasa.gov/> for more information) and the joint Japanese-US Hayabusa Asteroid Sample Return Mission. Dr. Sandford was a member of the team that recovered the Stardust Sample Capsule when it returned to Earth on Jan. 15, 2006 and led the preliminary examination effort on the organics in the returned samples.

2007-21: Director's Colloquium by Chris McKay

On Tuesday, Aug. 14, at 2 p.m. in the Main Auditorium (N-201), Dr. Chris McKay will present a Director's Colloquium entitled 'Titan: rain, storms, lakes and organic goo.' This is the ninth in a series of 10 colloquia in the Director's Colloquium Summer Series. All staff, but especially the Ames resident summer students, are cordially invited to attend. This is your opportunity to learn about Titan from one of the experts. A short abstract and bio follow.

Abstract: It has been a bit over two years since the Huygens Probe landed successfully on Titan the largest moon of Saturn. What was found was not what was expected. Here are the latest results and unsolved mysteries from the analysis of the data from the Probe and the Cassini Orbiter.

Biographical sketch: Dr. Christopher P. McKay, planetary scientist with the Space Science Division of NASA Ames. Chris received his Ph.D. in AstroGeophysics from the University of Colorado in 1982 and has been a research scientist with the NASA Ames Research Center since that time. His current research focuses on the evolution of the solar system and the origin of life. He is also actively involved in planning for future Mars missions including human exploration. Chris been involved in research in Mars-like environments on Earth, traveling to the Antarctic dry valleys, Siberia, the Canadian Arctic, and the Atacama desert to study life in these Mars-like environments. His was a co-I on the Titan Huygen's probe in 2005, the Mars Phoenix lander mission just launched, and the Mars Science Lander mission for 2009. He is the deputy program scientist for Constellation - the NASA program for future human exploration of the moon and Mars.

2007-22: Director's Colloquium by Nathalie Cabrol

On Tuesday, Aug. 21, at 2 p.m. in the Main Auditorium (N-201), Dr. Nathalie Cabrol will present a Director's Colloquium entitled, "The High Lakes Project." This is the last colloquium in the Director's Colloquium Summer Series. All staff, but especially the resident summer students, are cordially invited to attend. This work is part of the astrobiology effort to find life in extreme environments. There will be refreshments served in the lobby of Building N-200 following the presentation.

Abstract: Since 2003, the NASA Astrobiology Institute has been supporting the investigation of high-altitude lakes (4,400 m to 6,000 m) in the Bolivian and Chilean Andes. Their physical environment of this atmosphere, high ultraviolet radiation, high daily temperature amplitude, ice, sulfur-rich volcanism, and hydrothermal springs, combined with the changing climate in the Andes and the rapid loss of aqueous habitat provide parallels to ancient Martian lakes 3.5 billion years ago. Documenting this analogy is one of the focuses of the High-Lakes Project (HLP). Another is to characterize extreme terrestrial aqueous habitats to broaden our knowledge of Earth's biosphere, and in the process, accumulate and archive information on threatened and often poorly known ecosystems before they disappear as the climate changes. We will present results on the Licancabur lake (5,916 m) after the 2006 diving expedition and Laguna Blanca (4,340 m). They unravel unique, diverse and surprisingly abundant life which adaptation to rapidly changing environmental and climatic conditions have implications for planetary exploration, especially for our understanding of habitat and life sustainability potential.

Biographical Sketch: Nathalie Cabrol is a planetary geologist at the SETI Carl Sagan Center and Space Science Division at NASA Ames. Her expertise is in the evolution of water on Mars and the exploration of extreme environments. She leads exploration and research projects (astrobiology, robotics, analogs) and is a member of the Mars Exploration Rover science team. She was the main advocate for the Gusev crater landing for the Spirit rover on Mars. She is the PI and expedition leader of the High-Lakes Project exploring the highest volcanic lakes on Earth (5,700 m to 6,150 m) as analogs to ancient Martian lakes. There, she scuba dives with her team to bring new insights into poorly known extreme lake ecosystems. Cabrol was elected Women of Discovery (Air and Space) in 2005 and Wings WorldQuest Fellow (2007), an organization promoting women explorers.

2007-23: Director's Colloquium by Phil Sadler and Gene Giacomelli

On Tuesday, Sept. 18, at 2 p.m. in the Space Sciences Auditorium (N-245), Phil Sadler and Gene Giacomelli will present a Director's Colloquium entitled "Conceptual Lunar Habitat and Greenhouse." All staff are cordially invited to attend. There will be a wine and cheese reception following the colloquium outside the auditorium.

The presenters will first describe their efforts with the South Pole Food Growth Chamber. The chamber was built for the NSF/Office of Polar Programs and they are currently operating it remotely. They will next describe their efforts with the Mars Greenhouse and Cable Culture system that they developed for inflatable space modules. The Mars Greenhouse was not necessarily something that could survive on Mars, but was constructed to demonstrate the light-weight growing system and the possibility of using natural sunlight on Mars. The whole greenhouse weighs about 250 lbs. Finally, they will present their Lunar Habitat Model. The Lunar Habitat is about 5 feet across and the inflatable module is the size of a 'Concertina.' They will show a short video showing the construction of the Lunar Greenhouse and Post Harvest Module.

Sadler presently owns and operates Sadler Machine Co., a small machine shop in Tempe, Ariz., and works in cooperation with the University of Arizona's Controlled Environment Agriculture Center in inventing, developing, and fabricating, controlled environment hardware for polar and space environments. Recent projects include a Conceptual Lunar Greenhouse Design, Mars Greenhouse and NSF's South Pole Food Growth Chamber. He has a B.S. in botany.

Giacomelli is professor and director of the Controlled Environment Agriculture Program at the University of Arizona. He received a Ph.D. in horticultural engineering from Rutgers University in 1983. His research interests include controlled environment plant productions systems (greenhouse and growth chamber) research, design, development and applications, with emphases on: crop production systems, nutrient delivery systems, environmental control, mechanization and labor productivity.

2007-24: Director's Colloquium by Dr. Douglas Engelbart

On Wednesday, Oct. 24, at 10:30 a.m., in Building N-258, Room 127, (downstairs auditorium), Dr. Douglas Engelbart will present a Director's Colloquium entitled "Augmenting Human Intellect." All of staff are cordially invited to attend. Space is limited, so plan on arriving early to ensure a seat.

Abstract: For decades, my dominant goal has been to boost mankind's collective capability for understanding and coping with our most complex, urgent problems. The complexity-urgency factors are increasing at an accelerating rate, while the collective capability to understand and deal with them is falling ever farther behind. Ultimate consequence ...? I'll outline the "Bootstrapping-Strategy Framework" that I've developed: "Facilitating the Co-Evolution" of multiple societal and technological innovations towards "Boosting our Collective IQ" -- explicitly breaking the paradigms that still bind us to the outdated print technology. Then, I'll focus on early "Tool-System" innovations that enable more-flexible evolution to get underway, with smooth transition from "Legacy Tools and Documents/Files" towards the necessary, future "Open Hyperdocument System" (OHS).

Bio: Douglas Engelbart received a Bachelor's degree in electrical engineering from Oregon State University in 1948. Over 1948-1951, he worked at the NACA Ames Aeronautical Laboratory (now named the NASA Ames Research Center). He received a Ph.D. in electrical engineering and computer science from Berkeley in 1955. In 1957, he joined Stanford Research Institute (now SRI International) and established the Augmentation Research Center which focused on augmenting human intellect. The lab pioneered a hypermedia system called NLS (for on-Line System). At the 1968 Fall Joint Computer Conference in San Francisco, Dr. Engelbart made the first public demonstration of the computer mouse, hypermedia and on-screen video teleconferencing. Additional pioneering designs from the Augmentation Research Lab include hypermedia publishing, multiple windows, and integrated hypermedia email. In 1989, he and his daughter founded the Bootstrap Institute to create high-performance organizations by developing enabling technologies. Engelbart has authored over 25 publications and generated 20 patents (including the patent for the computer mouse). In 2000, President Clinton presented him with the National Medal of Technology, the United States' highest award for technological achievement.

2007-25: Director's Colloquium by Dr. Percival McCormack

On Monday, Nov. 5, at 3 p.m. in the Space Sciences Auditorium (N-245), Dr. Percival McCormack will present a Director's Colloquium entitled "Introduction to Nanobiology." All staff is cordially invited to attend. A wine and cheese reception will follow the colloquium.

Abstract: The colloquium will provide an introduction to nanobiology. Topics to be covered include technologies for the visualization of biological systems at the nanoscale, scanning probe and tunneling microscopy, atomic force microscopy, magnetic resonance force microscopy, nanolasers nanoparticles, quantum dots, the use of supermagnetic nanoparticles for the study of living cells, carbon nanotubes, nanowires, dendrimers and cantilevers.

Bio: Dr. Percival McCormack received his doctorate in nuclear physics and an M.D from Trinity College in Dublin Ireland. He is currently Professor of Bioengineering, Biophysics and Physiology at the University of Illinois at Chicago. He has been a flight surgeon for NASA, USAF, and USN. He has held a number of faculty positions, including as visiting professor of bioengineering at the University of Ulster, instructor in human physiology and biology in microgravity and hypergravity at the Naval Postgraduate School in Monterey, and visiting professor of biological physics at Trinity College. His research interests span a wide range of disciplines, but most recently he has focused on nanotechnology applications in biomedicine, mechanical engineering and aerospace engineering.

2007-26: Director's Colloquium by Dr. George Donohue

On Friday, Nov. 16, at 2 p.m, in the Main Auditorium (N-201), Dr. George Donohue will present a Director's Colloquium entitled "Air Transportation: A Tale of Prisoners, Sheep and Autocrats." All staff is cordially invited to attend. A cookies and punch reception will follow the colloquium in the lobby of Building N-200.

Abstract: Donohue's research at George Mason University has focused on treating the nation's air transportation system as a complex adaptive system with six interacting layers. Most of these layers are non-linear networks, characterized by stochastic feedback control systems. His research in the Center for Air Transportation Systems Research (CATSR) has focused on collecting and analyzing the probability density functions that characterize these networks. These data are then used to build computer models of the entire interacting system. As we gain a better understanding of the true nature of this critical transportation system and its adaptive mechanisms, we evaluate both policy and technical modifications that may improve the overall system performance.

Bio: Donohue, has a Ph.D. in mechanical and aerospace engineering, an M.S. in mechanical and aerospace engineering and a BSME in mechanical engineering. From 1994 to 1998, he was the associate administrator of Research and Acquisition at the Federal Aviation Administration and is currently a professor of Systems Engineering and Operations Research in the Volgenau School of Information Technology and Engineering at George Mason University in Virginia. He is also a senior research professor in the School of Public Policy and the founding director of the Center for Air Transportation Systems Research at George Mason University. He has won numerous awards, such as the Secretary of Defense Meritorious Civilian Service Medal in 1977 and the Air Traffic Control Association Clifford Burton Memorial Award in 1998. He has published over 60 reports and articles and is the editor of the principle reference book on Air Transportation Systems Engineering. He has been listed in Who's Who in America since 1992, was named one of Federal Computer Week's top 100 Executives in 1997, and was also named one of the top 100 decision makers in Washington, D.C. by the National Journal in 1997.

2007-27: Director's Colloquium by Dr. Marcia McNutt

On Friday, Nov. 27, at 1 p.m., in the Main Auditorium (N-201), Dr. Marcia McNutt, President and CEO of Monterey Bay Aquarium Research Institute will present a Director's Colloquium entitled "Ocean Exploration for the 21st Century." All staff is cordially invited to attend. A cookies and punch reception will follow the colloquium in the lobby of Building N-200.

Abstract: The ocean is Earth's largest living space and contains most of its biomass. Yet 95 percent of the ocean is unknown and unexplored. Fortunately, thanks to a number of technological innovations, we now have the tools necessary to undertake a systematic exploration of the ocean. Autonomous underwater vehicles can be preprogrammed to execute precise surveys throughout the water column lasting up to weeks without pause. Remotely operated vehicles equipped with physical, chemical, and biological sensors function as our eyes, ears, noses, and hands in the deep sea. Ocean observatories extend multidisciplinary studies into the 4th dimension of time. New data base systems allow the systematic cataloguing, archiving, and dissemination of information that cannot be reduced to a simple list of numbers, allowing researchers who did not participate in the explorations to answer questions that could not have even been posed at the time the data were collected. The discoveries being made with these new tools range from new pathways for energy flow through the marine food web to processes responsible for the creation of submarine canyons.

Bio: Dr. Marcia McNutt received her PhD in Earth Sciences at Scripps Institution of Oceanography in La Jolla, Calif. After a brief appointment at the University of Minnesota, she spent the next three years at the US Geological Survey in Menlo Park, Calif., working on the problem of earthquake prediction. In 1982, she joined the faculty at MIT in Cambridge, Mass. At MIT, she was appointed the Griswold Professor of Geophysics and served as director of the Joint Program in Oceanography and Applied Ocean Science and Engineering, a cooperative graduate educational program between MIT and the Woods Hole Oceanographic Institution. McNutt's research ranges from studies of ocean island volcanism in French Polynesia to continental break-up in the Western U.S. to uplift of the Tibet Plateau. She has participated in 15 major oceanographic expeditions, and served as chief scientist on more than half of those voyages. She has published 90 peer-reviewed scientific articles. McNutt's honors and awards include membership in the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences. She served as president of the American Geophysical Union from 2000-2002 and chaired the President's Panel on Ocean Exploration, convened by President Clinton to examine the possibility of initiating a major U.S. program in exploring the oceans.

2007-28: Director's Colloquium by Dr. Marty Hoffert

Dr. Marty Hoffert has been invited back to Ames by the Global Research into Energy and the Environment at NASA (GREEN) team to present a Director's Colloquium entitled "Electricity from Orbit: The case for R & D" on Wednesday, Dec. 5, at 11 a.m. in the Main Auditorium. He will talk about how cost-effective, space solar power (SSP)--the beaming of abundant high-intensity solar power from space through atmospheric windows at laser or microwave frequencies for electric power at the surface--could be a breakthrough technology for large-scale power generation, provide highly flexible power distribution and a sustainable carbon-neutral base load for Earth. Hoffert is Professor Emeritus of Physics and former chair of the Department of Applied Science at New York University. The complete abstract and bio for Hoffert can be accessed at the following link below. This colloquium will be followed by a GREEN seminar entitled "Renewable Energy: What's NASA's role?" to be held on Dec. 6, at 1 p.m., in the Main Auditorium.

Abstract: Cost-effective space solar power (SSP)--the beaming of abundant high-intensity solar power from space through atmospheric windows at laser or microwave frequencies for electric power at the surface--could be a breakthrough technology for large-scale power generation, providing highly flexible power distribution and a sustainable carbon-neutral base load for Earth. Much higher than the surface mean solar flux, continuous sunlight in space avoids otherwise cost-pacing massive storage and transmission of intermittent terrestrial solar and windpower to match electric demand curves. SSP would be markedly accelerated by experiments feasible now, some employing ISS, including orbital mirrors and microwave and laser beaming in space. Marty will describe his proposed demo of wireless power transmission from geosynchronous orbit (GEO) using diode laser transmitters in space and surface PV module receivers employing a self-deploying single launch one metric tonne satellite payload. This experiment would demonstrate continuous electric power transfer from orbit orders of magnitude greater than anything done before. With near term and "on the shelf" components, early launch opportunities, and the ISS as testbeds, near term experiments could accelerate SSP from paper studies to a real alternate energy option in as little as a three-to-five-year timeframe at relatively modest cost.

Bio: Martin I. Hoffert is Professor Emeritus of Physics and former Chair of the Department of Applied Science at New York University. He has been on the research staff of the Curtiss-Wright Corporation, General Applied Science Laboratories, Advanced Technology Laboratories, Riverside Research Institute and National Academy of Sciences Senior Resident Research Associate at the NASA/Goddard Institute for Space Studies. Prof. Hoffert has published broadly in fluid mechanics, plasma physics, atmospheric science, oceanography, planetary atmospheres, environmental science, solar and winds energy conversion and space solar power. His research in alternate energy conversion includes wind tunnel and full-scale experiments on innovative wind turbines, photovoltaic generation of hydrogen, and wireless power transmission applied to solar power satellites. His present efforts focus on energy technologies that could stabilize climate change from the fossil fuel greenhouse—including (but not limited to) space solar power.

Director's Colloquia (2008)

- 2008-1 (1/10/2008) Dr. Max Bernstein
H. Julian Allen Award Presentation: UV Irradiation of Polycyclic Aromatic Hydrocarbons in Ices: Production of Alcohols, Quinones, and Ethers
- 2008-2 (2/5/2008) William McDonough
Cradle to Cradle: A Celebration of Abundance
- 2008-3 (2/12/2008) Terry Fong and Matt Deans
Robotic Site Survey at Haughton Crater
- 2008-4 (3/11/2008) Jim Woolsey
Energy, Security and the Long War of the 21st Century
- 2008-5 (5/15/2008) Vince Ambrosia
“NASA Science Serving Society: UAV Sensor Mission Support to the Southern California Firestorms of October 2007
- 2008-6* (6/10/2008) Jack Boyd
Reflections on NASA's 50th Anniversary: The Giants on Whose Shoulders We Stood
- 2008-7 (6/12/2008) Dr. Hugo Cable
Linear Optical Quantum Information Processing, Imaging and Sensing, via N00N States
- 2008-8* (6/17/2008) Dr. Jennifer Heldmann
Prospecting for Water Ice on the Moon: NASA's Lunar Crater Observation and Sensing Satellite (LCROSS) Mission
- 2008-9 (6/19/2008) Mathew Whalley
Design and Flight Test Results for a Hemispherical LADAR Developed to Support Unmanned Rotorcraft Urban Operations Research
- 2008-10* (6/24/2008) Dr. Jonathan Trent
Global Research into Energy and the Environment at NASA (GREEN)
- 2008-11* (7/8/2008) Dr. Lynn Rothschild
Life in Extreme Environments: Sunburn, sex and life in the universe
- 2008-12* (7/10/2008) Andrew Magill
Future of Air Travel - the Commercial Side

- 2008-13* (7/15/2008) Dr. Louis Allamandola
From Infrared Astrophysics to Astrobiology
- 2008-14* (7/22/2008) Dr. James Arnold
**Synopsis of Ames's Contributions to Entry Technology and Applications:
A Historical Perspective 1953 – 2036**
- 2008-15 (7/23/2008) Dr. Jonathan Dowling
Quantum Optical Sensing, Imaging, and Computing
- 2008-16* (7/29/2008) Dr. David Des Marais
**Exploring for Evidence of Habitable Environments and Life on Early Earth and
on Mars**
- 2008-17* (7/31/2008) Professor Patricia Burchat
The Dark Side of the Universe
- 2008-18 (8/4/2008) Professor Andrew Hargadon
How Breakthroughs Happen: The Surprising Truth about How Companies Innovate
- 2008-19* (8/5/2008) Dr. Pete Worden
Protecting Earth from Asteroids
- 2008-20* (8/7/2007) Dr. Aubrey de Grey
Prospects for Defeating Aging Altogether
- 2008-21* (8/12/2008) Dr. Chris McKay
Missions to Investigate the Polar Ice of Mars: Phoenix and Beyond
- 2008-22* (8/19/2008) Dr. Seth Shostak
When Will We Discover the Extraterrestrials?
- 2008-23 (8/26/2008) Dr. Paul Wolpe
Are Institutional Review Boards (IRBs) Hindering Research?
- 2008-24 (9/2/2008) Dr. Mark Kasevich
Atom Interferometry
- 2008-25 (10/28/2008) Dr. James Gosling
The Impact of Open Source Software on Space Exploration
- 2008-26 (11/12/2008) Professor Peter Michelson
The Fermi Gamma-ray Space Telescope: The First 3 Months

*Denotes that the colloquium is available on DVD in the library

2008-1: 2007 H. Julian Allen Award Presentation

On Thursday, Jan, 10, at 2 p.m. in the Space Science Auditorium (N-245), Drs. Max Bernstein, Scott Sandford and Louis Allamandola of the Space Sciences Division and Professor Richard Zare of Stanford University, will present the 2007 H. Julian Allen Award lecture for their award winning paper entitled "UV Irradiation of Polycyclic Aromatic Hydrocarbons in Ices: Production of Alcohols, Quinones, and Ethers." The paper has received over 120 citations since being published in Science in 1999. The paper was co-authored by Seb Gillette, Simon Clemett, and Richard Zare all then at Stanford University. This paper has had a significant impact in a wide variety of fields of scientific research. A wine and cheese reception will follow the lecture in the upstairs lobby of N-245. All staff is cordially invited, but please arrive on time to ensure a seat.

Abstract: Great strides have been made in our understanding of interstellar material thanks to advances in infrared astronomy and laboratory astrophysics. Ionized polycyclic aromatic hydrocarbons (PAHs), shockingly large molecules by earlier astrochemical standards, are widespread and very abundant throughout much of the cosmos. In cold molecular clouds, the birthplace of planets and stars, interstellar molecules freeze onto dust and ice particles forming mixed molecular ices dominated by simple species such as water, methanol, ammonia, and carbon monoxide. Within these clouds, and especially in the vicinity of star and planet forming regions, these ices and PAHs are processed by ultraviolet light and cosmic rays forming hundreds of far more complex species, some of biogenic interest. Eventually, comets and meteorites seed primordial planets with these compounds, where they take part in the budding chemistry on these young worlds. The H. Julian Allen Colloquium will summarize how we have arrived at this understanding.

2008-2: Director's Colloquium by William McDonough

On Tuesday, Feb. 5, at 2 p.m., in the Main Auditorium, (N-201) William McDonough will present a Director's Colloquium entitled "Cradle to Cradle: A Celebration of Abundance." The colloquium is co-sponsored by the GREEN Team. Following the colloquium, there will be a director's reception in the lobby of building N-200. This colloquium will be taped, but not broadcast. Therefore, to ensure your seat, plan to arrive early, as a sell-out crowd is not unlikely.

Abstract: William McDonough will speak about his Cradle to Cradle philosophy and design practice. This vision of the hopeful, positive and inspiring possibilities of an environmentally and economically intelligent future by design draws inspiration from the astonishing effectiveness of natural systems. Cradle to Cradle design, as opposed to "cradle to grave," offers a new paradigm for human activity that creates a sustaining relationship with the natural world by emulating living systems that are effective, cyclical, synergetic and regenerative.

Bio: William McDonough is a world-renowned architect and designer and winner of three U.S. presidential awards: the Presidential Award for Sustainable Development (1996), the National Design Award (2004); and the Presidential Green Chemistry Challenge Award (2003). Time magazine recognized him as a "Hero for the Planet" in 1999, stating that "his utopianism is grounded in a unified philosophy that--in demonstrable and practical ways--is changing the design of the world."

McDonough has been a leader in the sustainable development movement since its inception. He designed and built the first solar-heated house in Ireland in 1977 while still a student at Yale University, and he designed the first "green office" in the U.S. for the Environmental Defense Fund in 1985. In 2002, he and German chemist Dr. Michael Braungart co-authored "Cradle to Cradle: Remaking the Way We Make Things." McDonough is the founder of two design firms, including William McDonough & Partners, which has created numerous landmarks of the sustainability movement since 1981, designing homes, offices, corporate campuses, academic buildings, communities and cities.

2008-3: Director's Colloquium by Drs. Terry Fong/Matthew Deans

On Tuesday, Feb. 12, at 2 p.m., in the Space Sciences Auditorium (N-245), Drs. Terry Fong and Matthew Deans of the Intelligent Robotics Group will present a Director's colloquium entitled "Robotic Site Survey at Haughton Crater." There will be a wine and cheese reception outside the auditorium following the colloquium.

Abstract: When NASA returns to the moon, detailed surveys will be needed at a variety of sites in order to establish a lunar outpost. To investigate how robots can be used to perform this task, the Intelligent Robotics Group (IRG) recently conducted a field test at Haughton Crater in the Canadian Arctic. During July 2007 two NASA Ames K10 rovers performed detailed surveys of several simulated lunar outpost sites. The rovers carried ground-penetrating radar developed at the Jet Propulsion Laboratory to map subsurface structure and a 3D scanning laser from Optech, Inc. to map terrain topography.

In this talk, they will present an overview of the Haughton Crater Site Survey Field Test, including field deployment, remote operations and results. They will also provide an overview of the navigation, computer vision and user interface software (including Google Earth and IRG's "Viz" tool) that enabled the K10 rovers to autonomously perform their surveys. The presentation will conclude with remarks about how this work supports current NASA human-robotic system development and analog tests.

Bios: Dr. Terry Fong is the leader of the NASA Ames Intelligent Robotics Group. Prior to this, Fong was the deputy leader of the Virtual Reality and Active Interfaces Group at the Swiss Federal Institute of Technology. From 1997 to 2000, he was vice president of Development for Fourth Planet, Inc., a developer of real-time visualization software.

Dr. Matthew Deans is the deputy leader of the NASA Ames Intelligent Robotics Group. He has been at Ames since 2002. Deans has participated in field robotics deployments in Antarctica, the Atacama Desert in Chile, Haughton Crater in the Canadian Arctic and several sites in the continental US.

2008-4: Director's Colloquium/GREEN Team Event by Jim Woolsey

On Tuesday, March 11, at 2 p.m., in the Space Sciences Auditorium (N-245), Jim Woolsey will present a colloquium entitled, "Energy, Security and the Long War of the 21st Century." This event is co-sponsored by the Director's Colloquium series and the GREEN team. Please arrive early, as we expect this to be well attended, and seating is limited. A wine and cheese reception will follow.

ABSTRACT: Woolsey will talk about two risks to our nation's security: one from terrorist attack and another from climate change. Both risks are substantially heightened by our dependence on oil and by the nature of our system for producing, distributing and using electricity. He will suggest some ways to deal with both problems.

BIO: Jim Woolsey has had an impressive career in public service, including presidential appointments in both Republican and Democratic administrations. Highlights include serving as director of the CIA from 1993 to 1995 and as Under Secretary of the Navy from 1977 to 1979. Currently, Woolsey is Chairman of the Advisory Boards of the Clean Fuels Foundation and the New Uses Council, and a Trustee of the Center for Strategic & International Studies and the Center for Strategic & Budgetary Assessments. He also serves on the National Commission on Energy Policy.

2008-5: Director's Colloquium by Ames Disaster Response Team

On Thursday, May 15, at 1:30 p.m., Vince Ambrosia and Francis Enomoto will present a Director's Colloquium entitled, "NASA Science Serving Society: UAV Sensor Mission Support to the Southern California Firestorms of October 2007." The colloquium will take place in the Space Sciences Auditorium on the second floor of Bldg. N-245 and will be followed by a reception in the lobby. Please note the colloquium begins at 1:30 p.m.

Abstract: In late October 2007, a series of large wildfires, spawned by Santa Ana winds, spread throughout Southern California. The wildfires burned through over 500,000 acres of wildland and urban fringe, forcing the evacuation of over a half-million residents. Using NASA Earth Science Applications Program funding, a team composed of NASA Ames researchers had been developing new capabilities to observe and provide real-time, fire-related sensor information to disaster managers, utilizing innovative NASA capabilities. Those capabilities included the new Ikhana UAV platform, the NASA Ames-developed AMS-Wildfire sensor and the Ames-developed Collaborative Decision Environment to share critical information among disparate emergency management teams and science team members. Over a five day period, the team flew the new NASA Ikhana UAV during four missions over the 11 major fires burning in the region. Real-time data was relayed to the fire incident command centers as well as to the three county emergency operations centers.

This presentation will highlight the capabilities demonstrated during the summer and fall of 2007 over the wildfire events, and the unique NASA Ames partnership that facilitated this endeavor. Insight will be provided into the future of the technologies, science and concepts vividly displayed during a true "test of fire."

Bio: Ambrosia is a research scientist in the Biospheric Science Branch. He was the principal investigator on a NASA-funded project to derive and mature new remote sensing capabilities for improving wildfire observation strategies. Enomoto is a computer engineer in the Intelligent Systems Division that led the effort to develop a decision support tool known as the Collaborative Decision Environment.

2008-6: Director's Colloquium by Jack Boyd, Ames Chief Historian

On Tuesday, June 10, at 2 p.m. in the Main Auditorium (N201), Jack Boyd will kick off the Director's Colloquium 2008 Summer Series with a talk entitled, "Reflections on NASA's 50th Anniversary: The Giants on Whose Shoulders We Stood." This will be followed by a reception in the lobby of Building N200. No one is more qualified to discuss the history of Ames than Jack. All staff, including all of our summer interns, are cordially invited to what I believe will be a fascinating colloquium.

Abstract: Why explore? Much will be written as NASA reaches its 50th Anniversary this October. I would like to share with you a personal view of the 60 years I have been with NACA and NASA and reflect on the enormously talented individuals at Ames who helped develop the technology that made space exploration possible.

Taking humans to the edge of their known world both requires new technology, and returns radical new insights into the world. Without exploration, science and engineering became routine and uninteresting. In this presentation, we will explore how the NASA Ames Research Center has contributed scientific and engineering expertise to the exploration missions at the heart of NASA over its 50-year history. We will cover Ames' work on the early manned space programs, the space shuttle, lunar science, planetary exploration, Mars and the prospects of life in the universe. We will pay special attention to those giants who helped make all of this possible.

Bio: John W. Boyd (Jack) currently serves as Senior Advisor to the Center Director, the Senior Advisor for History and the Center Ombuds. Jack has degrees from the aeronautical engineering program at Virginia Polytechnic Institute and State University (Virginia Tech), and the Sloan executive master of business administration program at Stanford University. Jack started at Ames in 1947, when it was the Ames Aeronautical Laboratory and still part of the National Advisory Committee for Aeronautics (NACA). He worked with some of the greatest aerodynamicists of his generation. His own work as an aeronautical research engineer involved wind tunnel studies of supersonic and subsonic aircraft and included major contributions to theories of conical camber. He later did early research on the design of unpiloted planetary probes to explore Mars and Venus, and he helped develop early configurations for the Mercury, Gemini and Apollo capsules.

Beginning in the mid 1960s, Jack increasingly served in managerial positions at NASA Ames. He served as Executive Assistant to the Ames Center Director, Deputy Director of Dryden Flight Research Center, Deputy and Associate Director of Ames Research Center and Associate Administrator for Management at NASA Headquarters. Additionally, he has served as Chancellor for Research for the University of Texas System.

2008-7: Director's Colloquium by Dr. Hugo Cable

On Thursday, June 12, at 2 p.m. in the Space Sciences Auditorium (N245), there will be a Director's Colloquium by Dr. Hugo Cable entitled, "Linear Optical Quantum Information Processing, Imaging and Sensing, via N00N States." This will be followed by a reception in the lobby outside the auditorium.

Abstract: With only conventional resources, most physical detection devices involving counting or intensity measurements are ultimately limited by shot-noise – an intrinsic statistical uncertainty. This is a practical constraint for ultra-sensitive magnetometers, interferometers and gyroscopes. Typically, laser light is subject to an uncertainty that scales as $1/\sqrt{N}$, where N is the intensity or photon number. However, through the use of exotic quantum probe states, the intrinsic measurement error can be made to scale as $1/N$. One particular state with this property is the so-called High N00N state, which has a strong quantum character - for large photon numbers N , it represents a macroscopic superposition of two spatially distinct light modes. N00N states exhibit both super-resolution, for which the associated de Broglie wavelength is a factor $1/N$ smaller than the single photon wavelength, and supersensitivity ($1/N$ error scaling). A potential application is gravitational wave detection, such as is being attempted by the LIGO experiment, and in principle the use of entangled quantum states could reduce the demands for lasing power from hundreds of kilowatts to milliwatts. I will give an overview, and present my own work on N00N-state generators using linear optics. This contributes to the considerable technical challenges for using N00N-states, by showing how the exponentially-scaling inefficiencies of previous proposals for sources can be overcome.

Bio: Dr. Hugo Cable is a theoretical physicist who has worked on a variety of topics concerning quantum optics and quantum information. From 2002 to 2005, he completed his PhD studies as a Member of the Theoretical Quantum Optics and Quantum Information group under Professor Peter Knight at Imperial College London. His thesis, supervised by Dr. Terry Rudolph, was on the topic of localizing relational degrees of freedom. This topic is motivated in part by the question of whether light from independent sources can demonstrate interference, which stirred a good deal of debate in the quantum optics community. Related issues arise for widely reported interference experiments with Bose Einstein condensates and in other fields, and his thesis work shows how these diverse examples can be treated using a common approach. Since 2005, he has been a post-doctoral researcher in the Quantum Science and Technologies Group of Professor Jonathan Dowling at Louisiana State University, exploring a number of questions concerning quantum imaging and quantum metrology. Particular achievements include developing a method for generating N00N states of large photon number using linear optics, which scales efficiently, in contrast to all previous proposals. In another direction, he has looked at the feasibility of proposals for quantum interferometric lithography, using an optical parametric amplifier as a high-flux source of non-classical light.

2008-8: Director's Colloquium by Dr. Jennifer Heldmann

On Tuesday, June 17th, at 2:00pm in the Main Auditorium (N201), Dr. Jennifer Heldmann will present a Director's Colloquium entitled "Prospecting for Water Ice on the Moon: NASA's Lunar Crater Observation and Sensing Satellite (LCROSS) Mission. This will be followed by a reception in the Lobby of Building N200. All of staff including all of our summer interns are cordially invited to come learn about an exciting mission that Ames leads.

Abstract: NASA's Lunar Crater Observation and Sensing Satellite (LCROSS) is scheduled for launch in late 2008. LCROSS seeks to confirm the presence or absence of water ice in a permanently shadowed crater near one of the Moon's poles. The mission, which is a co-manifested payload launching with the Lunar Reconnaissance Orbiter in late 2008, will use the Earth departure upper stage (EDUS) of the launch vehicle as a kinetic impactor. The impact creates an ejecta plume whose properties, including water ice and vapor content, will be observed by a shepherding spacecraft (S-S/C) plus Earth- and space- based telescopes. Following a similar trajectory of the EDUS, the S-S/C will fly through the EDUS impact plume and then the S-S/C will also impact the Moon. The S-S/C impact will likely also be observable to ground-based and space-based telescopes.

We'll overview the rationale and goals for the mission, mission design, and opportunities for observations. We will also provide updates on site selection activities and progress on the coordination of the ground- and space-based observation campaign. Finally, will highlight Ames activities in support of this exciting mission.

Bio: Dr. Jennifer Heldmann received her BA in Astrogeophysics from Colgate University an MS in Space Studies and a minor in Geology from the University of North Dakota, and a PhD in Planetary Science from the University of Colorado, Boulder. Upon completion of her doctorate degree, Jennifer worked as a National Research Council Post-Doctoral Fellow at the NASA Ames Research Center until 2005. She then served as a Principal Investigator at the SETI Institute in the Center for the Study of Life in the Universe and at NASA Ames Research Center. She is currently a civil servant scientist in the Division of Space Science & Astrobiology at Ames. Jennifer's current research interests lie in studying the Earth, Moon, and Mars. For the LCROSS mission she serves on the Science Team, Payload Team, and as the Observation Campaign Coordinator.

She has served on several NASA committees to assist with planning for future exploration of the solar system. She currently participates in the Human Exploration of Mars Science Analysis Group (HEM-SAG) chartered by NASA HQ, the MEPAG Mars Forward Lunar Objectives Science Analysis Group, the Mars Human Precursor Science Steering Group, Lunar Exploration Analysis Group (LEAG), and Outpost Science Exploration Working Group (OSEWG).

2008-9: Director's Colloquium by Mathew Whalley

On Thursday, June 19, 2008, in the N245 Auditorium, there will be an Director's Colloquium by Mathew Whalley entitled "Design and Flight Test Results for a Hemispherical LADAR Developed to Support Unmanned Rotorcraft Urban Operations Research."

Abstract: A newly-developed, hemispherical laser detection and ranging (LADAR) sensor will be described. The system was created to support field testing of algorithms for landing site selection and obstacle field navigation. The seminar will review the results of flight tests with a calibration target and obstacle field, and for mapping of a large structure. Results will also be presented for using the sensor in conjunction with previously developed autonomous landing site selection software. In addition to the LADAR topic, a brief overview of the Autonomous Rotorcraft Project will be provided, including a summary of ongoing research.

Bio: Matt Whalley has worked as a researcher with the US Army Aeroflightdynamics Directorate since 1984. He holds a BS in Aeronautical Engineering from Cal Poly San Luis Obispo, and an MS in Aerospace Engineering from Stanford University.

2008-10: Director's Colloquium by Dr. Jonathan Trent

On Tuesday, June 24, at 2 p.m. in the Main Auditorium (N201), Dr. Jonathan Trent will present a director's colloquium entitled, "Global Research into Energy and the Environment at NASA (GREEN)." This will be followed by a reception in the lobby of Building N-200. All staff, including all of our summer interns, are cordially invited to come learn about our effort to develop a research program into innovative new ways to produce biofuels and reduce our dependence on oil.

Abstract: During the last year, a small group of Ames scientists and engineers have explored the prospects of a GREEN Ames with funds from Google. The goal was to answer the questions: What can Ames scientists and engineers contribute to research into energy and the environment on Earth? Will this knowledge be applicable to NASA's ultimate goal to colonize other planets? Is Ames prepared for GREEN, if this becomes a major theme for NASA in the coming years? What is the future of NASA?

In this director's colloquium, Jonathan Trent, who led the GREEN team for the past year, will consider these questions in the context of our human predicament in the 21st Century. He will discuss global research into energy and the environment at NASA.

Bio: Dr. Jonathan Trent came to NASA Ames in 1998 to be part of the Astrobiology program and study molecular adaptations of extremophiles-organisms living in extremely inhospitable environments; like near-boiling sulfuric acid. In 1999, he began applying his knowledge of the structure and function of extremophilic biomolecules to problems in nanotechnology and in 2006 he received the Nano50 award for innovation in nanotechnology.

In addition to working at NASA, Trent is an adjunct professor in the Department of Biomolecular Engineering at UC Santa Cruz and a Fellow of the California Academy of Sciences. He received his Ph.D. in Biological Oceanography from Scripps Institution of Oceanography before embarking on a career that has included positions at the Max Planck Institute for Biochemistry in Germany, the University of Copenhagen in Denmark, the University of Paris at Orsay, France, the Boyer Center for Molecular Medicine at Yale Medical School, and Argonne National Laboratory. He is currently the project scientist on an exploratory biofuels project at Ames.

2008-11: Director's Colloquium by Dr. Lynn Rothschild

On Tuesday, July 8, at 2 p.m., in the Main Auditorium (N201), Dr. Lynn Rothschild will present a Director's Colloquium entitled, "Life in Extreme Environments: Sunburn, sex and life in the universe." This will be followed by a reception in the lobby of Building N-200. All staff, including all of our summer interns, are cordially invited to come learn about an exciting aspect of our astrobiology research program at Ames.

Abstract: Life in the universe is likely to be based on organic carbon. Several consequences flow from this, including susceptibility to certain environmental extremes such as temperature, pH and radiation. Organisms that can push these extremes, "extremophiles" (a term that was invented at Ames), provide insights into evolutionary biology on earth, and provide a guide for locating life elsewhere.

While "extremophile" is considered a sexy moniker that is too liberally applied, we will take a dispassionate view of the who/why/where of extremophiles on earth in order to better understand the multidimensional envelope for life in the universe. Of particular interest to our lab has been radiation damage, an environmental variable that causes damage to all major biological polymers, including the genetic material itself, and thus has been linked to the origin of sex. And if that weren't enough, extremophiles are a bioprospector's goldmine, and will thus play a crucial role in transferring terrestrial life beyond earth.

Bio: Dr. Lynn J. Rothschild, is an evolutionary biologist-astrobiologist at NASA's Ames Research Center, and professor at Stanford University, where she teaches astrobiology and space exploration, inter alia. She has broad training in biology, with degrees from Yale, Indiana and a Ph.D. from Brown University. Since arriving at Ames in 1987, her research has focused on how life, particularly microbes, has evolved in the context of the physical environment, both here and potentially elsewhere. She has co-edited a book on the subject entitled, "Evolution on Planet Earth: The Impact of the Physical Environment" (Academic Press, 2003). Rothschild has studied carbon metabolism and DNA damage and repair in the laboratory setting and on algae, work that has taken her to field sites in such locations as the thermal areas in Yellowstone National Park, New Zealand, Australia, Kenya's Rift Valley, hypersaline environments in the San Francisco Bay, Baja California and the Bolivian Andes. Her current lab members are actively pursuing topics ranging from radiation resistant invertebrates to resistance mechanisms in halophiles and algae to synthetic biology. Most recently, she has taken to the air in conjunction with the Aeronautics and Astronautics Department at Stanford, flying experiments up to 106,000 feet on high altitude balloons.

2008-12: Director's Colloquium by Andrew Magill

On Thursday, July 10, at 2 p.m. in the Main Auditorium (N201), Andrew Magill, director of Marketing for Boeing Commercial Airlines, will present a Director's Colloquium entitled, "Future of Air Travel - the Commercial Side." This will be followed by a reception in the lobby of Building N-200. All staff including all of our summer interns are cordially invited to come learn about the future of air travel.

Abstract: At any given time there are between 6,000 and 12,000 commercial airplanes in the air around the world. During peak time, there are 2.3 million passengers flying. And every day another six million fly. By 2026, travel will more than double - increasing to 2.6 times today's levels. Where are all those people going? What technological challenges will the growing need for air travel present to engineers and scientists? Magill will cover the needs of air travel, the benefits and challenges, and then the plan to make air travel safer, more reliable, more convenient, and... even more comfortable.

Bio: As director of Marketing for Boeing Commercial Airplanes, Andrew (Drew) Magill leads marketing initiatives for commercial airplane products and services. In addition, Magill is responsible for understanding and communicating market requirements and the market outlook across media, customers, investors, suppliers and employees.

Previously, Magill directed the team that develops the company's long-term market outlook and customer requirements for both commercial airplanes and airplane services. Prior to that, Magill led the airplane marketing team for the Americas region following the rapid changes caused by the events of 2001.

Magill joined Boeing in 1988 as an engineer on the 737 program, later moving to the 777 development team. Magill subsequently assumed positions working directly with airlines to configure airplanes and define future feature requirements. In 1995, Magill joined the marketing organization, conducting financial and economic analysis to support financing for airplane purchases. Later, he developed market campaign strategies for Boeing in the United Kingdom and Ireland. Magill also led efforts to identify new market opportunities created by liberalization in European air travel.

Magill holds a bachelor's degree in aeronautics and astronautics from the University of Washington and a master's in business administration from Seattle University. He serves as board chair-elect for Leadership Eastside, a non-profit program of leadership training for community leaders; and on the board of the Sammamish YMCA.

Magill is married and has two sons. His outside interests include family activities, skiing, sailing, windsurfing and triathlon.

2008-13: Director's Colloquium by Dr. Louis Allamandola

On Tuesday, July 15th, at 2:00pm in the Main Auditorium (N201), Dr. Louis Allamandola will present a Director's Colloquium entitled "From Infrared Astrophysics to Astrobiology". This will be followed by a reception in the Lobby of Building N200. All of staff including all of our summer interns are cordially invited to come learn about the work Ames does in infrared astrophysics.

Abstract: Great strides have been made in our understanding of interstellar material thanks to advances in infrared astronomy and laboratory astrophysics. Ionized polycyclic aromatic hydrocarbons (PAHs), shockingly large molecules by earlier astrochemical standards, are widespread and very abundant throughout much of the cosmos. In cold molecular clouds, the birthplace of planets and stars, interstellar atoms and molecules freeze onto extremely cold dust and ice particles forming mixed molecular ices dominated by simple species such as water, methanol, ammonia, and carbon monoxide. Within these clouds, and especially in the vicinity of star and planet forming regions, these ices are processed by ultraviolet light and cosmic rays forming hundreds of far more complex species, some of biogenic interest. Eventually, these are delivered to primordial planets by comets and meteorites. As these materials are the building blocks of comets and related to carbonaceous micrometeorites, they are likely to be important sources of complex organic materials delivered to habitable planets (including the primordial Earth) and their composition may be related to the origin of life. This talk will focus on the chemical evolution of these cosmic materials and their relevance to astrobiology.

Bio: Dr. Lou Allamandola has 20 years of experience in pioneering laboratory studies of ices of interstellar and planetary interest. Formally trained as a specialist in low temperature spectroscopy at the University of California at Berkeley under the tutelage of Professor George C. Pimentel, followed by postdoctoral research on energy transfer at cryogenic temperatures with Professor Joseph W. Nibler at Oregon State University, Lou worked for seven years in the Astrophysics Laboratory at Leiden University in the Netherlands where he developed the techniques required to prepare and study laboratory analogs of interstellar/pre-cometary ice grains using spectroscopic methods. He established a new laboratory at NASA's Ames Research Center in 1984. He opened up the field of interstellar polycyclic aromatic hydrocarbons (PAHs) with Xander Tielens and John Barker, and is heavily involved in the laboratory studies of PAHs under relevant interstellar conditions. He has also participated in astronomical measurements of infrared spectra using the Kuiper Airborne Observatory, the NASA Infrared Telescope Facility, and the United Kingdom Infrared Telescope. Dr. Allamandola has served on several NASA advisory councils and is currently an active member of the Origins Subcommittee at NASA Headquarters. He has served on several scientific organizing committees and as proceedings editor for international symposia. He received NASA-Ames' H. Julian Allen Award for Best Scientific Paper from Ames in 1985, NASA's Exceptional Scientific Achievement Medal in 1992, and was named an Ames Associate Fellow in 1995.

2008-14: Director's Colloquium by Dr. James Arnold

On Tuesday, July 22nd, at 2:00pm in the Main Auditorium (N201), Dr. James Arnold will present a Director's Colloquium entitled "Synopsis of Ames's Contributions to Entry Technology and Applications: A Historical Perspective 1953 - 2036". This will be followed by a reception in the Lobby of Building N200. All of staff including all of our summer interns are cordially invited to come learn about our work in entry physics.

Abstract: This presentation builds upon the first in the 2008 summer lecture series by Jack Boyd: "Reflections of NASA's 50th Anniversary: The Giants on Whose Shoulders we Stood." The focus in this presentation is on Ames-specific contributions to the field of entry technology and their application to NASA programs and missions. The presentation begins with Allen's 1953 development of the blunt body concept and follows its impact on crewed vehicles and robotic exploration that began with Seiff's 1963 "inversion" of the entry problem to use blunt entry probes to determine the nature of unknown planetary atmospheres. Topics in the crewed vehicles "thread" include Apollo, Shuttle, the Columbia Accident Investigation, and current work on the Orion Crew Exploration Vehicle. This thread concludes with conjecture relating to future work on crewed vehicles with sharp leading edges and a synopsis of studies from the recent Human Mars Design Reference Mission 5. The "robotic" thread begins with the demonstration by the Planetary Atmospheric Experiment Test (PAET) that preceded the use of Seiff's Atmospheric Structure Instrument (ASI) on missions to Mars, Venus, Jupiter and Titan. Also included in the robotic "thread" are contributions to the proposed MESUR mission, and the flown Mars Pathfinder, MER and Stardust projects. Ames' current entry technology contributions to the Mars Science Laboratory (MSL) vehicle are outlined, including the efforts to implement Ames'-invented Phenolic Impregnated Carbon Ablator (PICA) as its heat shield material. The "robotic" thread is concluded with conjecture regarding the use of small, affordable probes for solar system exploration.

Bio: Dr. Arnold's career with NASA spanned four decades. His contributions include experimental and theoretical research, branch, division and directorate management and a tour of duty at NASA Headquarters. He received his B.S. at the University of Kansas in Engineering Physics, his M.S. from Stanford University in Aeronautics and Astronautics and his Ph.D. from York University, Toronto in Molecular Physics. Dr. Arnold received NASA's Medal for Outstanding Leadership and the NASA Medal for Exceptional Scientific Achievement. He was a recipient of the president's SES Meritorious Executive Award and the SES Distinguished Executive Award. Dr. Arnold served as an investigator on the Columbia Accident Investigation Board (CAIB) in 2003 and was given the NASA Public Service Medal in recognition for his contributions. He currently leads an advisory group to the Orion TPS Advanced Development Project. Dr. Arnold is a Fellow of the American Institute of Aeronautics and Astronautics, a member of the International Academy of Astronautics. His interests include TPS, aerocapture/entry systems, real-gas computational fluid dynamics, high enthalpy test facilities, nanotechnology and solar system exploration.

2008-15: Director's Colloquium by Professor Jonathan Dowling

On Wednesday, July 23rd, at 2:00 p.m., Dr. Jonathan Dowling will present a Director's Colloquium in the Space Sciences Auditorium (N245) entitled "Quantum Optical Sensing, Imaging, and Computing". This will be followed by cookies and punch reception in the lobby outside the auditorium. All of staff is cordially invited to attend. A short abstract and bio are presented below.

Abstract: Quantum states of light, such as squeezed states or entangled states, can be used to make measurements (metrology), produce images, and sense objects with a precision that far exceeds what is possible classically, and also exceeds what was once thought to be possible quantum mechanically. The primary idea is to exploit quantum effects to beat the shot-noise limit in metrology and the Rayleigh diffraction limit in imaging and sensing. Quantum optical metrology has received a boost in recent years with an influx of ideas from the rapidly evolving field of optical quantum information processing. Both areas of research exploit the creation and manipulation of quantum entangled states of light. We will review some of the recent theoretical and experimental advances in this exciting new field of quantum optical metrology, focusing on examples that exploit a particular two-mode entangled photon state denoted the High-N00N state.

Bio: Jonathan P. Dowling is a Horace C. Hearne Jr. Professor of Theoretical Physics and Co-Director the Hearne Institute for Theoretical Physics, Louisiana State University, Baton Rouge, Louisiana. Prof. Dowling received his PhD in mathematical physics from the University of Colorado at Boulder in 1988. He was a Postdoctoral Research Scientist at the Max Planck Institute for Quantum Optics in Garching, Germany. He was also a National Research Council postdoctoral research associate in the Science & Technology group at Army Aviation and Missile Command (AMCOM), Redstone Arsenal, Alabama, before joining AMCOM as a Research Physicist in 1994. He then left AMCOM to take a position in 1998 as a Research Scientist and Supervisor of the Quantum Computing Technologies Group at NASA JPL. He took up his current post in Louisiana in 2004. Dowling has over 120 published articles and holds eight US patents. He is a Fellow of the Institute of Physics and of the Optical Society of America.

2008-16: Director's Colloquium by Dr. David Des Marais

On Tuesday, July 29, at 2 p.m. in the Main Auditorium (N201), Dr. David Des Marais will present a Director's Colloquium entitled, "Exploring for Evidence of Habitable Environments and Life on Early Earth and on Mars." All staff, including all of our summer interns, are cordially invited to come learn about what evidence we have for life on the early Earth and Mars.

Abstract: The more we learn about the early evolution and diversity of our own biosphere, the more we are encouraged in our search for life elsewhere in our solar system. Fossilized remains of microorganisms occur in the oldest-known, well-preserved sedimentary rocks. Microbes persisted in environmental extremes and at depths in Earth's crust that far exceed the tolerances of plants and animals. Coordinated studies of ancient rocks and microbial ecosystems are revealing our early biosphere and also honing our strategies for exploring other worlds. Mars is the other planet in the solar system whose climate was most similar to that of Earth. The Mars Exploration Rovers and a fleet of orbiters have found that liquid water has chemically altered the Martian crust. Liquid water participated in rock weathering reactions, such as iron and sulfur oxidation, that provided potential sources of energy for life. Methane discovered in the atmosphere apparently emanates from the subsurface, consistent with liquid water at depth. We must send rovers to landing sites where rocks have preserved evidence of long-lived habitable environments and perhaps even remnant signatures of life. The most promising samples should then be returned to state-of-the-art Earth-based laboratories.

Bio: David Des Marais has investigated the biogeochemistry of microbial ecosystems and Earth's early biosphere, and he has participated in Mars exploration. He has published more than 160 technical articles and chapters on the stable isotope geochemistry of carbon in lunar samples, meteorites and oceanic basalts, the biogeochemistry of marine cyanobacterial communities, the geochemistry of ancient sedimentary carbon, and Mars science. Des Marais is a member of the science teams of NASA's 2003 Mars Exploration Rover mission, the CRISM instrument of the 2005 Mars Reconnaissance Orbiter mission and the CHEMIN instrument of 2009 Mars Science Laboratory mission. He is the P.I. of the Ames team of the NASA Astrobiology Institute. He is a Fellow of the Geochemical Society, the European Association of Geochemistry, the International Society for the Study of the Origins of Life, the California Academy of Sciences and the American Geophysical Union.

2008-17: Director's Colloquium by Professor Patricia Burchat

On Thursday, July 31, at 3:30 p.m in the Main Auditorium (N-201), Professor Patricia Burchat, Chair of the Physics Department at Stanford University, will present a director's colloquium entitled, "The Dark Side of the Universe." All staff including our summer interns are cordially invited to come learn about the scientific revolution in our understanding of cosmology from one of the leading experts in the field.

Abstract: A scientific revolution in our understanding of the universe is under way. In the last decade or so, cosmology has become an observational science that has led to two mysterious observations: about a quarter of the universe is "dark matter," which gravitationally attracts but is otherwise invisible, and about two-thirds is "dark energy," which causes space itself to expand at an ever-increasing rate. That means only a small fraction of the energy in the universe is due to matter that we understand! In this presentation, we will explore the evidence for dark matter and dark energy, and the experiments being developed to investigate their fundamental nature.

Bio: Patricia Burchat is Chair of the Physics Department at Stanford University. She studies differences in the time evolution of matter and antimatter created at the Stanford Linear Accelerator Center (SLAC), and the gravitational bending of light by massive clusters of galaxies in the universe. She has held several leadership positions in the 550-person international BABAR Collaboration at SLAC. She was granted a Guggenheim Fellowship in 2005. She was appointed a Bass University Fellow in Undergraduate Education in 2004, and a Fellow of the American Physical Society in 2001. In 2007, Burchat was awarded the Walter J. Gores Award for excellence in teaching.

2008-18: Director's Colloquium by Professor Andrew Hargadon

On Monday, August 4, at 10:30 a.m., in the Main Auditorium (N201), Professor Andrew Hargadon will present a Director's Colloquium on his book entitled, "How Breakthroughs Happen: The Surprising Truth about How Companies Innovate." All staff is cordially invited to come learn about new ideas and approaches for the management of innovation.

Professor Hargadon received his Ph.D. from the Management Science and Engineering Department in Stanford University's School of Engineering, where he was named Boeing Fellow and Sloan Foundation Future Professor of Manufacturing. He received his B.S. and M.S. in Stanford University's Product Design Program in the Mechanical Engineering Department. Andrew Hargadon is an Associate Professor of Technology Management at the Graduate School of Management at University of California, Davis. He is the founding Director of the Center for Entrepreneurship and the Energy Efficiency Center at UC Davis. Prior to his academic appointment he worked as a product designer at Apple Computer and taught in the Product Design program at Stanford University.

Professor Hargadon's research focuses on the effective management of innovation and the strategic role of design in managing technology transitions, particularly in the development and commercialization of sustainable technologies. His research has been used to develop or guide new innovation programs in organizations as diverse as the Canadian Health Services, Silicon Valley start-ups, Hewlett-Packard and the US Navy. He has published numerous articles and chapters in leading scholarly and applied publications. He teaches corporate executive programs and serves on the advisory boards of several start-up companies.

This lecture is co-sponsored by the Innovative Partnerships Program.

2008-19: Director's Colloquium by Dr. S. Pete Worden

On Tuesday, August 5, at 2 p.m. in the Main Auditorium (N201), Dr. S. Pete Worden will present a Director's Colloquium entitled, "Protecting Earth from Asteroids." There has been growing interest and attention by the public and the scientific community in identifying potentially hazardous asteroids and considering mitigation strategies. Congress has assigned NASA these tasks. In this talk, Worden will review the current status of these studies and programs, as well as introduce some future possibilities and issues. All staff, including all of our summer interns, are cordially invited to come learn about what can be done to protect the planet from asteroid impacts. There will be a reception in the lobby on Bldg. N200 immediately following the colloquium.

Bio: Dr. Simon P. Worden (Brig. Gen., USAF, ret.) is the Director of the NASA Ames Research Center. Prior positions for Worden include: Research Professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona; Director of Development and Transformation, Space and Missile Systems Center, Air Force Space Command; Consultant to the Defense Advanced Research Projects Agency (DARPA) on space related issues; Congressional Fellow with the Office of Senator Sam Brownback as advisor on NASA and space issues; Staff officer for the President's National Space Council. Worden spearheaded efforts to revitalize U.S. civil space exploration and earth monitoring systems. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences, and strategic studies, served as a scientific co-investigator for two NASA space science missions and is a recognized expert on space issues – both civil and military. Worden retired in 2004 after 29 years of active service in the United States Air Force.

2008-20: Director's Colloquium by Dr. Aubrey de Grey

On Thursday, August 7, at 1 p.m in the Main Auditorium (N201), Dr. Aubrey de Grey will present a Director's Colloquium entitled, "Prospects for Defeating Aging Altogether" (see abstract below). Dr. Aubrey de Grey is a British biomedical gerontologist educated at Cambridge University in the UK. He is the author of the "Mitochondrial Free Radical Theory of Aging." He works on the development of engineered negligible senescence - a tissue-repair strategy that would rejuvenate the human body and thereby allow an indefinite lifespan. He is the Chairman and Chief Science Officer of the Methuselah Foundation and editor-in-chief of the academic journal Rejuvenation Research. All staff is cordially invited to attend what should be an outstanding colloquium.

Abstract: It may seem premature to be discussing approaches to the effective elimination of human aging as a cause of death at a time when essentially no progress has yet been made in even postponing it. However, two aspects of human aging combine to undermine this assessment. The first is that aging is happening to us throughout our lives but only results in appreciable functional decline after four or more decades of life: this shows that we can postpone the functional decline caused by aging arbitrarily well without knowing how to prevent aging completely, but instead by increasingly thorough molecular and cellular repair. The second is that the typical rate of refinement of dramatic technological breakthroughs is rather reliable (so long as public enthusiasm for them is abundant) and is fast enough to change such technologies (be they in medicine, transport or computing) almost beyond recognition within a natural human lifespan. In this talk I will explain, first, why (presuming adequate funding for the initial preclinical work) therapies that can add 30 healthy years to the remaining lifespan of healthy 60-year-olds may well arrive within the next few decades, and, second, why those who benefit from those therapies will very probably continue to benefit from progressively improved therapies indefinitely and thus avoid debilitation or death from age-related causes at any age.

2008-21: Director's Colloquium by Dr. Chris McKay

On Tuesday, Aug. 12, at 2 p.m., in the Main Auditorium (N201), Chris McKay will present a Director's Colloquium entitled, "Missions to Investigate the Polar Ice of Mars: Phoenix and Beyond." McKay will discuss the latest findings from the spacecraft Phoenix that sits on the northern arctic plains of Mars. Weather forecast- high (-22F), low (-110F). He will then discuss the future missions that might undertaken that have the ultimate goal of understanding whether life once existed on Mars. All of staff, including all of our summer interns, are cordially invited to come learn about the Phoenix mission and NASA's future Mars exploration goals from one of the world leading experts in planetary science. There will be a reception in the lobby on Bldg. N200 immediately following the colloquium.

Bio: Dr. Christopher P. McKay is a planetary scientist with the Space Science Division of NASA Ames. McKay received his Ph.D. in astrogeophysics from the University of Colorado in 1982, and has been a research scientist with the NASA Ames Research Center since that time. His current research focuses on the evolution of the solar system and the origin of life. He is also actively involved in planning for future Mars missions including human settlements. McKay has been involved with polar research since 1980, traveling to the Antarctic dry valleys and more recently to the Siberian and Canadian Arctic to conduct research in these Mars-like environments. Dr. McKay is a recipient of the prestigious Kuiper Award from the Division of Planetary Sciences of the American Astronomical Society for his contributions.

2008-22: Director's Colloquium by Dr. Seth Shostak

On Tuesday, Aug. 19, at 2 p.m. in the Main Auditorium (N201), Dr. Seth Shostak of the SETI Institute will present a Director's Colloquium entitled, "When Will We Discover the Extraterrestrials?" All staff, including all of our summer interns, are cordially invited to come learn about the prospects for finding aliens. Shostak is an outstanding lecturer, you will thoroughly enjoy his colloquium. There will be a reception in the lobby on Bldg. N200 immediately following the colloquium.

Abstract: The scientific hunt for extraterrestrial intelligence is now into its fifth decade, and we still haven't uncovered a confirmed "peep" from any cosmic company. Could this mean that finding aliens, even if they exist, is a project for the ages -- one that might take centuries or longer? New technologies for use in the Search for Extraterrestrial Intelligence (SETI) suggest that, despite the continued dearth of signals from other societies, there is good reason to expect that success might be just around the corner -- that we might find evidence of sophisticated civilizations within a few decades. Why this is so, and what contact would mean, are the subject of this talk on the continuing efforts to establish our place in the universe of thinking beings.

Bio: Seth Shostak is a Senior Astronomer at the SETI Institute, and has been an observer for Project Phoenix as well as an active participant in various international forums for SETI research. He is a frequent presenter of the Institute's work in the media, through lectures, and via the Institute's weekly radio show, *Are We Alone?*, for which he's the host. Shostak is an astronomer with a BA in physics from Princeton and a PhD in astronomy from Caltech. Before coming to SETI, Shostak did research work on galaxies using radio telescopes at observatories and universities in America and Europe. He is science editor for "The Explorer", gives more than 50 talks annually for both academic and general audiences, and writes magazine articles (and books) about SETI. He also teaches informal education classes on astronomy and other topics in the Bay Area.

2008-23: Director's Colloquium by Dr. Paul Wolpe

On Tuesday, Aug. 26, at 10 a.m. in the Space Sciences Auditorium (N245), Dr. Paul Wolpe will present a Director's Colloquium entitled, "Are Institutional Review Boards (IRBs) Hindering Research?" All staff including all of our summer interns are cordially invited to come learn about how human research boards function. All PIs doing human research at Ames should attend this colloquium.

Abstract: In this week's Newsweek (Aug. 25 issue), Sharon Begley's "On Science" column takes IRBs to task. She says they are a major impediment to research, that they are stifling knowledge, and that they are part of the reason we don't have cures for cancer, for example. While obviously there is some hyperbole there, do IRBs function well? How well do they protect, and do they go to far? We will look at Begley's claims and do some critical self-examination, and discuss ways IRB function could be improved.

Bio: Paul Root Wolpe, Ph.D. is the Asa Griggs Candler Professor of Bioethics, Professor of Medicine, and the Director of the Center for Ethics at Emory University. He is the Immediate Past President of the American Society for Bioethics and Humanities, the professional organization for bioethicists, and is co-editor of the American Journal of Bioethics. Since 2001, he has been the consulting bioethicist for NASA.

2008-24: Director's Colloquium by Dr. Mark Kasevich

On Tuesday, Sept. 2, at 2 p.m., in the Main Auditorium (N201), Dr. Mark Kasevich will present a Director's Colloquium entitled, "Atom Interferometry." All staff is cordially invited to come learn about how atom interferometry can lead to new breakthrough technologies relevant to NASA's mission. There will be a reception in the lobby of Bldg. N200 immediately following the colloquium.

Abstract: Atom de Broglie wave interferometry has emerged as a tool capable of addressing a diverse set of questions in gravitational physics, and as an enabling technology for advanced sensors in geodesy and navigation. This talk will review basic principles, then discuss recent applications and future directions. Scientific applications to be discussed include measurement of G (Newton's constant), and tests of the Equivalence Principle and post-Newtonian gravity. Technological applications include development of precision gyroscopes and gravity gradiometers for advanced inertial navigation systems and gravity anomaly surveys. The talk will conclude with speculative remarks looking to the future: Can atom interference methods be used to detect gravity waves? Can non-classical (entangled/squeezed state) atom sources lead to meaningful sensor performance improvements?

Biographical Sketch: Mark Kasevich is a Professor of Physics and Applied Physics at Stanford University. His current research interests are centered on the development of quantum sensors of rotation and acceleration based on cold atoms (quantum metrology), application of these sensors to tests of general relativity, investigation of many-body quantum effects in Bose condensed vapors (including quantum simulation) and investigation of ultra-fast laser-induced phenomena.

2008-25: Director's Colloquium by Dr. James Gosling

On Tuesday, Oct. 28, at 11 a.m. in the Main Auditorium (N201), Dr. James Gosling, Fellow and Vice President of Sun Microsystems, will present a Director's Colloquium entitled, "The Impact of Open Source Software on Space Exploration." All staff are cordially invited to come learn about open source software from the pioneer who created the Java programming language.

Abstract: Dr. James Gosling will discuss the importance of open source software, which has been a cornerstone of the Sun Microsystems business model. Today, NASA conducts research and development in software and software technology as an essential response to the needs of NASA missions. Currently, NASA has several options for the release of these NASA-developed software technologies including using the NASA Open Source Agreement (NOSA). Gosling will relay his thoughts on what the impacts of open source software might be on NASA's space exploration program. There will be ample opportunity to ask questions about his talk as well as more general questions on software development.

Bio: In 1977, James Gosling received a B.Sc in Computer Science from the University of Calgary. In 1983, he earned a Ph.D in Computer Science from Carnegie Mellon University, and his doctoral thesis was entitled, "The Algebraic Manipulation of Constraints." While working towards his doctorate, he wrote a version of emacs (gosmacs), and before joining Sun Microsystems he built satellite data acquisition systems, a multiprocessor version of Unix, several compilers, mail systems and window managers. Since 1984, Gosling has been with Sun Microsystems, and is generally known best as the founder of the Java programming language. He did the original design of Java and implemented its original compiler and virtual machine. For this Achievement, he was elected to the United States National Academy of Engineering. He has written numerous books that provide the foundation of the Java programming language.

2008-26: Director's Colloquium by Professor Peter Michelson

On Wednesday, Nov. 12, at 2:00 p.m. in the Space Sciences Auditorium (N245), Professor Peter Michelson will present a Director's Colloquium entitled, "The Fermi Gamma-ray Space Telescope: The First 3 Months." There will be a reception outside the auditorium immediately following the colloquium. All Ames employees are cordially invited.

Abstract: The Fermi Gamma-ray Space Telescope (formerly GLAST) was launched by NASA on June 11, 2008. The Large Area Telescope (LAT) instrument measures cosmic gamma-ray radiation in the energy range 20 MeV to >300 GeV, with measurements by the GLAST Burst Monitor (GBM) of gamma-ray bursts from 8 keV to 30 MeV. The LAT, with a large improvement in sensitivity, large field-of-view, and much finer angular resolution compared to previous high-energy telescopes, observes 20 percent of the sky at any instant and covers the entire sky every three hours. Fermi is providing an important window on a wide variety of high-energy phenomena, including pulsars, black holes and active galactic nuclei; gamma-ray bursts; the origin of cosmic rays and supernova remnants; and searches for new phenomena such as supersymmetric dark-matter annihilations and exotic relics from the Big Bang. Michelson will describe the Fermi observatory and provide an overview of the observations made to date.

Bio: Dr. Michelson is a professor of physics at Stanford University. His research interests are in the field of high-energy astrophysics, particularly X-ray and gamma-ray observations and instrument development. He led the international team (involving 18 institutions) that developed the next-generation orbiting high-energy gamma-ray observatory known as the Fermi Gamma-ray Space Telescope. Michelson is a past member of the NASA Office of Space Science Structure and Evolution of the Universe Subcommittee (SEUS), and served on the Committee on Gravitational Physics of the National Research Council, and the High-Energy Astrophysics Panel of the NRC Decadal Astronomy Survey Committee.

Director's Colloquia (2009)

- 2009-1 (1/22/2009) Professor J. Christian Gerdes
Lanekeeping Assistance at the Vehicle Handling Limits
- 2009-2 (2/10/2009) Eric Roston
Do You Know How I Can Get There From the Interstellar Medium?
- 2009-3 (3/24/2009) Dr. Kenneth Ford
Toward Cognitive Prostheses
- 2009-4 (5/1/2009) Amory Lovins
Profitable Solutions to Climate, Oil and Proliferation
- 2009-5 (5/15/2009) Dr. Steven Squyres
Science Results from the Mars Exploration Rover Mission
- 2009-6 (6/1/2009) Dr. Antia Lamas-Linares
From Leggett inequalities to daylight quantum key distribution
- 2009-7 (6/9/2009) Dr. William Borucki
Kepler: A Step Toward Discovering Life in the Milky Way
- 2009-8 (6/16/2009) Dr. Dale Cruikshank
Cassini Explores the Saturn System
- 2009-9 (6/23/2009) Dr. Philip Russell
Aerosol particles & climate change on Earth: How coordinated measurements from aircraft, satellites, and surfaces are helping to reduce uncertainties
- 2009-10 (6/30/2009) Dr. S. Pete Worden
Protecting Earth from Asteroids
- 2009-11 (7/7/2009) Dr. Bernard Adelstein
Human Vibration Studies for NASA's Constellation Program
- 2009-12 (7/14/2009) Dr. Pamela Marcum
How the Stratospheric Observatory for Infrared Astronomy (SOFIA) Will Help Shape the Future of Infrared Astronomy
- 2009-13 (7/21/2009) Dr. Lynn Harper
Unleashing the Genius

- 2009-14 (7/22/2009) Colonel M.V. Smith
Space Power and the State
- 2009-15 (7/28/2009) Dr. Liane Guild
NASA's Airborne Remote Sensing of Coral Reefs
- 2009-16 (8/4/2009) Dr. Carl Pilcher
Astrobiology and Virtual Institutes
- 2009-17 (8/11/2009) Dr. Laura Iraci
Laboratory and General Circulation Model Studies of Cloud Formation on Mars
- 2009-18 (8/25/2009) Dr. Francis Everitt
Testing Einstein in Space: The Gravity Probe B Detective Story
- 2009-19 (10/27/2009) Dr. Elmar Fuchs
The Inner Structure of a Floating Water Bridge

*Denotes that the colloquium is available on DVD in the library

2009-1: Director's Colloquium by Professor Chris Gerdes

On Thursday, Jan. 22, at 2:00 p.m. in the NASA Ames Conference Center (Building 3), Professor Chris Gerdes will present a Director's Colloquium entitled, "Lanekeeping Assistance at the Vehicle Handling Limits." All staff is cordially invited to attend.

Abstract: Each year there are approximately 40,000 fatalities on US roadways, 40 percent of which result from a collision with a fixed obstacle in the environment. Simply helping the driver keep the vehicle in the lane, therefore, could save thousands of lives. This talk describes an approach to driver assistance based on artificial potential fields that define the lane boundaries as hazards with the minimum hazard in the center of the lane. Analogous to a marble rolling in a valley, the lanekeeping assistance system attempts to nudge the vehicle back to the lane center. When the driver is tracking the lane, the car feels exactly how it would without any assistance; as the driver deviates from the center, the car gently adds an additional steering command, producing an effect much like being attached to the road with a light spring. Gerdes will address the key question of whether this system performs safely at the limits of handling when the demand forces exceed the friction available between the tires and the road.

Biography: Dr. Chris Gerdes is an Associate Professor of Mechanical Engineering at Stanford University, and director of CarLab, a new community focused on automotive research at Stanford. Prior to joining Stanford, Gerdes was the project leader for vehicle dynamics at the Vehicle Systems Technology Center of Daimler-Benz Research and Technology, North America. His research interests include the development of driver assistance systems for lane keeping and collision avoidance, modeling and control of novel combustion processes for internal combustion engines, and diagnostics for automotive drive-by-wire systems. Gerdes is a past recipient of the Presidential Early Career Award for Scientists and Engineers in recognition for his work with driver assistance systems.

2009-2: Director's Colloquium by Eric Roston

On Tuesday, February 10th, at 2:00pm in the Space Sciences Auditorium (N-245). Eric Roston will present a Director's Colloquium entitled "Do You Know How I Can Get There From the Interstellar Medium?". There will be a reception following in the lobby. All of staff are cordially invited.

Abstract: We break the world down into categories of thought – boxes of a sort – to make it more comprehensible. Yet too much specialization obscures the simple and lovely story of how the world seems to work. Today, many of these categories, whether in our newspapers, congressional committees, or high school classes, are decades or centuries old, and no longer capture the acceleration of knowledge. We are continually inundated with stovepipe stories – Energy! Health! Climate! War!, their unifying tale left to decay in the background. Why not build an epic, singular narrative, starting from a universal common denominator and entwining science into our history, and history into current events?

Astrobiology is the beginning of this story, and NASA Ames Research Center anchors the young field. Roston relied on NASA science for much of the research in his book, *The Carbon Age* -- a four-year odyssey in which he answered for himself the question in the talk's title.

Bio: Eric Roston is a science journalist in Washington, DC, and author of *THE CARBON AGE: How Life's Core Element Has Become Civilization's Greatest Threat*. He is also Senior Associate in the Washington, DC, office of The Nicholas Institute for Environmental Policy Solutions, of Duke University.

Previously, Roston wrote for *TIME*, where he covered economics, politics and technology. He joined the magazine in 2000 as a business reporter in the New York bureau, covering stories such as the collapse of Enron, China's emergence as a force in global trade, and how advanced computing technologies are reshaping the economy. An eyewitness to the collapse of the World Trade Center on Sept. 11, 2001, Roston was a part of the reporting team that won a National Magazine Award for best single-issue coverage.

Roston has been a guest on Comedy Central's "The Colbert Report," CNN, MSNBC, ABC, CBC, National Public Radio and many radio stations. Roston, who is fluent in Russian, holds an M.A. in Russian literature and linguistics, and a B.A. in modern European history, both from Columbia University.

2009-3: Director's Colloquium by Dr. Kenneth Ford

On Tuesday, March 24, at 2 p.m. in the Space Science Auditorium (N-245), Dr. Kenneth Ford, Director, Florida Institute for Human and Machine Cognition, will present a Director's Colloquium entitled, "Toward Cognitive Prostheses." Following the colloquium there will be a reception outside the auditorium. All employees are cordially invited to attend.

Abstract: The emerging concept of human-centered computing (HCC) represents a significant shift in thinking about intelligent machines and, indeed, about information technology in general. Human-centered computing embodies a "systems view," in which human thought and action and technological systems are seen as inextricably linked and equally important aspects of analysis, design, and evaluation. From an AI perspective, the HCC framework is focused less on stand-alone exemplars of mechanical cognitive talent, and is concerned more with computational systems designed to amplify human cognitive and perceptual abilities. This approach results in systems that can be regarded as cognitive or perceptual prostheses, much as eyeglasses are a sort of ocular prosthesis. This shift in perspective places human/machine interaction issues at the center of the subject. The "system" in question isn't "the computer," but instead includes cognitive and social systems, computational tools, and the physical facilities and environment. Thus, human-centered computing provides a new research outlook for AI applications, with new research agendas and goals.

Biography: Kenneth Ford is Founder and Director of the Florida Institute for Human & Machine Cognition (IHMC), an independent not-for-profit research institute. Ford is the author or co-author of hundreds of scientific papers and six books. Ford's research interests include: artificial intelligence, cognitive science, human-centered computing, and entrepreneurship in government and academia. He received a Ph.D. in Computer Science from Tulane University. He is Emeritus Editor-in-Chief of AAAI/MIT Press and has been involved in the editing of several journals. Ford is a Fellow of the AAAI. Ford has received many awards and honors including the Doctor Honoris Causas from the University of Bordeaux in 2005 and the 2008 Robert S. Englemore Memorial Award for his work in artificial intelligence.

2009-4: Greenspace Director's Colloquium by Amory Lovins entitled, "Profitable Solutions to Climate, Oil and Proliferation"

Physicist, author and world-renowned energy innovator Amory Lovins will deliver a lecture entitled, "Profitable Solutions to Climate, Oil and Proliferation" in the Ames Main Auditorium, Building N201, on May 1, 2009 at 2 p.m. This event is co-sponsored by the Ames Greenspace Initiative as part of the Director's Colloquium Series. The lecture will be followed by a networking reception and refreshments with NASA staff and invited guests from the green community, including industry, academia and government.

Biography: Physicist Amory Lovins is Chairman and Chief Scientist of Rocky Mountain Institute (www.rmi.org) and Chairman Emeritus of Fiberforge, Inc. (www.fiberforge.com). Published in 29 books and hundreds of papers, his work has been recognized by the Blue Planet, Volvo, Onassis, Nissan, Shingo, and Mitchell Prizes, a MacArthur Fellowship, the Benjamin Franklin and Hapold Medals, ten honorary doctorates, an Hon. AIA and FRSA, Foreign Membership of the Royal Swedish Academy of Engineering Sciences, and the Heinz, Lindbergh, Right Livelihood, and World Technology Awards. He advises governments and major firms worldwide on advanced energy and resource efficiency, and has led the technical redesign of more than \$30 billion worth of facilities in 29 sectors to achieve very large energy savings at typically lower capital cost.

Background: The NASA Ames Greenspace Initiative aligns NASA's research and development programs with green activities by providing strategy, integration, and implementation support for a diverse portfolio of alternative energy and environmental projects across NASA Ames. We are committed to the establishment of Ames Research Center as a leader in the development of clean technologies in Silicon Valley. For more information about NASA Greenspace, please visit the Web site at: <http://www.nasa.gov/centers/ames/greenspace>

2009-5: Director's Colloquium by Professor Steven Squyres

On Friday, May 15, at 2:30 p.m., in the Main Auditorium (N201), there will be a Director's Colloquium by Professor Steven Squyres entitled, "Science Results from the Mars Exploration Rover Mission." This will be followed by a reception in the lobby of Building 200. All of staff is cordially invited. I highly recommend this colloquium, Professor Squyres will provide an in depth analysis of what we have learned from the Mars exploration rovers.

Abstract: The two Mars exploration rovers, Spirit and Opportunity, touched down on Mars in January 2004 and have been conducting extensive observations with the Athena science payload. Together, the two rovers have traversed more than 20 km. Spirit, located on the floor of Gusev crater, has investigated basaltic plains, as well as older materials in the Columbia Hills. The rocks of the Columbia Hills are granular in nature and range from breccias to finely laminated deposits that have undergone significant alteration by water. Recently, Spirit has discovered silica-rich deposits that may have formed in a hot spring or fumarole environment. Opportunity has carried out the first outcrop-scale investigation of ancient sedimentary rocks on Mars. The rocks are sandstones formed by wind and water erosion and re-deposition of fine-grained siliciclastics and sulfate-rich evaporites. While liquid water was present at Meridiani below and occasionally at the surface, the ancient environmental conditions recorded there are dominantly arid, acidic and oxidizing, and would have posed some significant challenges to life.

Biography: Steven Squyres's research focuses on the large solid bodies of the solar system: the terrestrial planets and the satellites of the Jovian planets. His work involves analysis of data from both spacecraft and ground-based telescopes, as well as a variety of types of geophysical modeling. Areas of particular interest include the tectonics of Venus, the history of water on Mars, and the geophysics of the icy satellites of the outer planets. Squyres has participated in a number of planetary spaceflight missions. Squyres is currently the scientific principal investigator for the Mars Exploration Rover Project. He is also a co-investigator on the Mars Express mission, and on the Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment. He is a member of the Gamma-Ray Spectrometer Flight Investigation Team for the Mars Odyssey mission, and a member of the Imaging team for the Cassini mission to Saturn.

2009-6: Director's Colloquium by Dr. Antia Lamas-Linares

On Monday, June 1, at 2:00 p.m. in the Space Sciences Auditorium (N245), there will be a Director's Colloquium by Dr. Antia Lamas-Linares entitled, "From Leggett inequalities to daylight quantum key distribution." This will be followed by a reception just outside the auditorium. All employees are cordially invited to attend.

Abstract: Entangled photons are extensively used both in fundamental tests of quantum mechanics and in quantum information applications such as quantum cryptography. In this talk, she will touch upon both of these contexts. Her lab has recently demonstrated a violation of a Leggett inequality, which requires very high purity sources, and excludes a class of non-local realistic models. On the applied side of quantum information, her lab has performed a number of experiments on free-space entanglement based Quantum Key Distribution (QKD). She will describe the basic system, using models based on quantum correlations that have been proposed by Ekert and by Bennett, Brassard and Mermin, and the steps necessary for the recent demonstration of daylight QKD.

Biography: Dr. Antia Lamas-Linares is an assistant professor of physics at the National University of Singapore (NUS). Her experimental research is in the broad field of quantum information, and specifically optical implementations of quantum protocols. She received her Dphil in Physics at the University of Oxford under the supervision of Professor Dirk Bouwmeester. She is well published and holds a patent on the "Method and apparatus for the production of entangled states of photons."

2009-7: Director's Colloquium by Dr. William (Bill) Borucki

On Tuesday, June 9, at 2 p.m. in the Main Auditorium (N201), Dr. William Borucki will kick off the 2009 Director's Colloquium Summer Series with a talk entitled "Kepler: A Step Toward Discovering Life in the Milky Way." This will be followed by a reception in the lobby of Building 200. All staff and especially our summer students are cordially invited to attend. This is an opportunity to hear about Kepler, one of the most exciting missions NASA has ever launched, from the science principal investigator himself.

Abstract: The first step in discovering the extent of life in our galaxy is to determine the number of terrestrial planets in the habitable zone (HZ) of solar-like stars. Recent discoveries based on the Doppler-velocity technique have shown that many stars have jovian-mass planets, but the presence of these planets could imply terrestrial planets are rare. The Kepler Mission is designed specifically to determine the frequency of terrestrial planets in and near the HZ. It will continuously monitor the brightness of more than 100,000 solar-like stars to detect patterns of transits that provide the size of the planet relative to the star and its orbital period. Combining these measurements with ground-based spectroscopy fixes the stellar parameters, the planet radius, orbital distance and location relative to the HZ. At the end of the mission, hundreds of terrestrial planets should be discovered in and near the HZ of many types of stars if such planets are common. Such a result implies that life could be ubiquitous in our galaxy. A null result would imply that we might be the only sentient life. The Kepler Mission was launched on March 6, 2009 and has now begun the collection of science data.

Biography: William Borucki is a space scientist at the NASA Ames Research Center in Mountain View, California. He first worked on the development of the heat shield for the Apollo Mission in the Hypersonic Free Flight Branch. After the successful moon landings, he transferred to the Theoretical Studies Branch where he investigated lightning activity in planetary atmospheres and developed mathematical models to predict the effects of nitric oxides and chlorofluoromethanes on the Earth's ozone layer. Currently, he is the science principal investigator for the Kepler Mission that will determine the frequency of Earth-size planets orbiting in the habitable zone of other stars. The Mission uses transit photometry to observe over 100,000 stars, was launched on March 6, 2009, has completed commissioning, and is now in science operations.

2009-8: Director's Colloquium by Dr. Dale Cruikshank

On Tuesday, June 16, at 2 p.m. in the Main Auditorium (N201), Dr. Dale Cruikshank will present the second colloquium in the 2009 Director's Colloquium Summer Series entitled, "Cassini Explores the Saturn System." This will be followed by a reception in the lobby of Building 200. All staff and especially our summer students are cordially invited to attend. This is an opportunity to learn about the Saturn system from one of the leading experts.

Abstract: The Cassini spacecraft has been orbiting Saturn for more than five years, sending back stunning pictures and other data about the planet, rings, moons and space environment. We'll look at some of the highlights, including the landing of the Huygens probe on Titan, Saturn's unexpected atmospheric activity beneath the haze, and some discoveries about the extraordinary diversity of Saturn's icy moons.

Biography: Dr. Dale Cruikshank has pioneered the application of infrared spectroscopy to small bodies in the Outer Solar System (OSS). His discoveries confirm the conjecture that ices are the dominant component of OSS bodies. With colleagues, he was first to find water ice in the Kuiper Belt, and methanol ice on a Centaur that links these bodies to comets. The ices he found on Triton and Pluto are the sources of the atmospheres of these two bodies. Cruikshank has pioneered the thermal infrared determinations of the albedos of small bodies beyond the asteroid main belt, leading to the recognition that low-albedo material is prevalent in the OSS. Cruikshank is one of the leading planetary scientists in the world with more than 250 professional publications. He has received numerous awards including having Asteroid 3531 named Cruikshank by the International Astronomical Union.

2009-9: Director's Colloquium by Dr. Philip Russell

On Tuesday, June 23, at 2 p.m. in the Main Auditorium (N201), Dr. Philip Russell will present the third colloquium in the 2009 Director's Colloquium Summer Series entitled, "Aerosol particles & climate change on Earth: How coordinated measurements from aircraft, satellites, and surfaces are helping to reduce uncertainties." This talk will be followed by a reception in the lobby of Building 200. All Ames employees and especially our summer students are cordially invited. This is an opportunity to learn how aerosols affect climate change from one of the leading experts.

Abstract: The 2007 assessment by the Intergovernmental Panel on Climate Change (IPCC) reported that uncertainty in radiative forcing of Earth's climate had been reduced compared to the previous assessment, a result of improved understanding of aerosol radiative effects. This talk shows how field experiments by NASA and collaborators, which coordinate measurements from aircraft, satellites, and Earth's surfaces, have contributed to that improved understanding. Included are early results from the recent Arctic Research of the Composition of the Troposphere from Aircraft and Satellites (ARCTAS) experiment in the Arctic and a look at the future, including next-generation satellites and advanced aircraft such as the Global Hawk.

Biography: Dr. Phil Russell leads the Sunphotometer-Satellite Group at NASA's Ames Research Center, where he previously was Chief of the Atmospheric Experiments Branch, Chief of the Atmospheric Chemistry and Dynamics Branch, and Acting Chief of the Earth System Science Division. He has led the development of unique airborne instruments to measure atmospheric composition and has led many studies using these and other instruments on aircraft, satellites, and Earth surfaces to determine aerosol and trace gas effects on radiant energy and climate. He has more than 130 publications, has been editor-in-chief of *Geophysical Research Letters* and has served on many NASA satellite science teams. He is a Fellow of the American Association for the Advancement of Science (AAAS) and has been a reviewer for the Intergovernmental Panel on Climate Change (IPCC), which received the Nobel Peace Prize in 2007. His PhD and MS degrees are from Stanford University.

2009-10: Director's Colloquium by Dr. S. Pete Worden

On Tuesday, June 30, at 2 p.m. in the Main Auditorium (N201), Dr. S. Pete Worden will present the fourth colloquium in the 2009 Director's Colloquium Summer Series entitled, "Protecting Earth from Asteroids." There has been growing interest and attention by the public and the scientific community in identifying potentially hazardous asteroids and considering mitigation strategies. Congress has assigned NASA these tasks. In this talk, Dr. Worden will review the current status of these studies and programs, as well as introduce some future possibilities and issues. This talk will be followed by a reception in the lobby of Building 200. All Ames employees and especially our summer students are cordially invited to attend. This is an opportunity to come learn about what can be done to protect the planet from asteroid impacts.

Biography: Dr. Simon P. Worden (Brig. Gen., USAF, ret.) is the Director of the NASA Ames Research Center. Prior positions for Worden include: Research Professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona; Director of Development and Transformation, Space and Missile Systems Center, Air Force Space Command; Consultant to the Defense Advanced Research Projects Agency (DARPA) on space related issues; Congressional Fellow with the Office of Senator Sam Brownback as advisor on NASA and space issues; Staff officer for the President's National Space Council. Worden spearheaded efforts to revitalize U.S. civil space exploration and earth monitoring systems. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences, and strategic studies, served as a scientific co-investigator for two NASA space science missions and is a recognized expert on space issues – both civil and military. Worden retired in 2004 after 29 years of active service in the United States Air Force.

2009-11: Director's Colloquium by Dr. Bernard Adelstein

On Tuesday, July 7, at 2 p.m. in the Main Auditorium (N201), Dr. Bernard (Dov) Adelstein will present the fifth colloquium in the 2009 Director's Colloquium Summer Series entitled, "Human Vibration Studies for NASA's Constellation Program." This talk will be followed by a reception in the lobby of Building 200. All Ames employees and especially our summer students are cordially invited. This is an opportunity to learn how human research carried out at Ames on the 20-G centrifuge is contributing to NASA's exploration mission.

Abstract: NASA's Constellation Program (CxP) encompasses a new family of crew and launch vehicles to return humans to the moon, to eventually explore more remote destinations, and to service the International Space Station after the Shuttle is retired. Analyses indicate the solid-rocket stage of the crew launch vehicle, Ares-I, will produce a pressure fluctuation (termed "thrust oscillation") that could deliver vibration to crew at levels far in excess of those seen in any prior NASA program. Consequently, thrust oscillation was raised to CxP's top risk and an Agency-wide effort was initiated to develop mitigation strategies. A key unanswered question for this effort was how far vibration levels should be lowered in order for crew to perform critical mission functions.

In the summer of 2008, an Ames team began a series of human-in-the-loop studies to provide explicit quantitative guidelines that would relate input seat vibration to decrements in crew performance for modern display technologies and concepts of operation. In addition to program background and historical context, this presentation will describe the sequence of five studies completed during the past year in our lab and on the Ames 20-G Centrifuge involving participants recruited from JSC's Astronaut Office and from the Ames community. Results from these studies are helping CxP set thrust oscillation limits and inform the selection of mitigation options.

Biography: Bernard (Dov) Adelstein has been with the Human Systems Integration Division and its predecessors at the NASA Ames Research Center since 1991. He received his M.S. and Ph.D. in Mechanical Engineering (MIT, 1981, 1989) for research on manual control interfaces for people impaired by involuntary tremor (i.e., internally generated limb vibration). At NASA, his research has centered on the assessment of coupled human-system performance for multi-sensory displays, with a focus on understanding human perception of time delays, inter-modal (haptic, visual, auditory) asynchronies, and on developing technologies to mitigate their impact on human performance. He serves the Constellation Program's Human System Integration Group (HSIG) as the subject matter expert on human vibration and was the human factors expert on the Ares-I Thrust Oscillation Focus Team.

2009-12: Director's Colloquium by Dr. Pamela Marcum

On Tuesday, July 14, at 2 p.m. in the Main Auditorium (N201), Dr. Pamela Marcum will present the sixth colloquium in the 2009 Director's Colloquium Summer Series entitled, "How the Stratospheric Observatory for Infrared Astronomy (SOFIA) Will Help Shape the Future of Infrared Astronomy." This presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially Ames summer students are cordially invited. This is an opportunity to learn about the future of airborne astronomy and specifically SOFIA from SOFIA's project scientist.

Abstract: The joint U.S. and German Stratospheric Observatory for Infrared Astronomy (SOFIA) will be a premier observatory facility during future decades for studying the physics and chemistry of stellar evolution processes. Utilizing the large suite of science instruments and the broad wavelength coverage of SOFIA, astronomers will be armed with unique capabilities to undertake a large breadth of investigations ranging from studies of the Solar System to the star forming history of galaxies over cosmic time. SOFIA is a German-built 2.5-meter telescope mounted in a modified Boeing 747-SP aircraft supplied by NASA. Flying at altitudes as high as 45,000-feet, SOFIA will be above most of atmospheric water vapor that severely limits the ability to do infrared and sub-mm observations using ground-based telescopes. SOFIA's first-generation instruments include broadband imagers, moderate resolution spectrographs capable of resolving broad features due to dust and large molecules, and high resolution spectrometers suitable for kinematic studies of molecular and atomic gas lines at suitable resolution. SOFIA science applications will be discussed, with special emphasis on investigations related to infrared spectroscopy of astrophysical gas, grains and ices.

Biography: Extragalactic astronomer Pamela Marcum recently joined NASA Ames as the SOFIA project scientist. Marcum received a B.S. and M.S. in Space Sciences and Physics from Florida Tech, where she analyzed the gravitational red shifts of white dwarf members of widely-separated stellar binaries. Her Ph.D. in astronomy is from the University of Wisconsin-Madison, where she worked on the near-IR and optical properties of galaxy groups, and participated in HST WF/PC2 Science Definition Team activities. After that she was an associate professor in the Department of Physics & Astronomy at Texas Christian University, and for three of those years she served as program scientist for WISE and Kepler, and as program officer managing the UV/optical/IR portfolio of the Research & Analysis grants program. At Ames, she continues her observational and theoretical studies of galaxy evolution.

2009-13: Director's Colloquium by Dr. Lynn Harper

On Tuesday, July 21, at 2 p.m. in the Main Auditorium (N201), Dr. Lynn Harper will present the seventh colloquium in the 2009 Director's Colloquium Summer Series entitled, "Unleashing the Genius." This talk will be followed by a reception in the lobby of Building 200. All Ames employees and especially Ames summer students are cordially invited. This is an opportunity to learn about the advances in commercial suborbital passenger systems that have opened the space frontier to a larger segment of society.

Abstract: On Oct. 4, 2004, a revolutionary period of space exploration and development began when SpaceShipOne and its intrepid citizen pilot Brian Binnie blasted into history with the first private manned spacecraft to exceed an altitude of 328,000 feet twice within the span of a 14-day period. The SpaceShipOne Team set two world records, won the 10 million dollar Ansari X-Prize, and ploughed a road into the space frontier that forever changed the nature of space exploration and development. And they did one more thing. They opened the space frontier to you. Over the next five years, commercial suborbital passenger systems will fly autonomous payloads as well as hands-on investigations. These low-cost billets could enable professional and student experiments to be flown several times a year, thereby providing a first-of-its-kind training ground for the next wave of space innovators and entrepreneurs. Suborbital missions have contributed to astronomical, terrestrial, and other areas of space research for over 60 years. Their transit through the atmosphere provides the opportunity to make astronomical and Earth observations at wavelengths and special observing geometries not accessible from the ground. The four to six minutes of microgravity experienced can be used to explore fluid, material, physiologic and gravitational biology effects throughout the dynamic altered gravity phases and their transition zones.

Biography: Lynn D. Harper is Lead of Integrative Studies for the NASA Ames Research Center Space Portal, a consortium to promote commercial space development for public benefit. She is currently acting as Deputy Project Manager for the Human Suborbital Flight Program. Harper was awarded NASA's Outstanding Leadership Medal for her role as one of the founders of the science of Astrobiology and her service as the first Lead for Astrobiology Advanced Concepts and Technologies. For several years, she was the Acting Chief and Deputy Chief of the Advanced Life Support Division at NASA Ames and oversaw the development of air and water regeneration systems that are now leading candidates for Space Station upgrades and bioregenerative life support projects. Harper has managed science instrument development programs for Space Shuttle, Space Station and unmanned planetary exploration spacecraft as well as computer and radio telescope development and applications programs for SETI.

2009-14: Director's Colloquium by Colonel M.V. Smith

On Wednesday, July 22, at 2 p.m. in the Space Sciences Auditorium (N245), Colonel M.V. Smith will present a Director's colloquium entitled, "Space Power and the State." This presentation will be followed by a reception outside the auditorium. All Ames employees including Ames summer students are cordially invited. Seating in the N245 auditorium is limited so arrive early to ensure a seat.

Abstract: Spacepower and the State explores the nature of spacepower and contemplates how states can best employ it consistent with their interests. The objective is to provide a practical theory of spacepower to help policy makers and strategists in their self-education about this vital yet poorly understood field of human endeavor. What is attempted here is a comprehensive and holistic spacepower theory that looks at all human spacefaring activities set against the geopolitical context of states and their relationship to one another. The central argument is that states are motivated to go to space to compete for security, prestige and wealth, as they do in every other environment. Naturally, the strategic cultures of the various states creates unique national styles of spacefaring, but from this we can explain all that states have done in space in the past, what is happening now, and we can reasonably anticipate the sorts of things that will happen in the future.

Biography: Colonel M.V. Smith is a PhD student of strategic studies at the University of Reading in the United Kingdom. Most recently he served as the Chief of "Dream Works," which is the Future Concepts shop in the Pentagon's National Security Space Office. Dream Works explores, develops, advocates, and links future concepts, capabilities, and promising technologies to advance the art of space faring across the security sector. He was the director of the Space-Based Solar Power Study, and served as a Visiting Military Fellow at National Defense University. He has served in various space and missile positions and as an instructor at the USAF Weapons School. He was Commander of the 321st Missile Squadron at F.E. Warren Air Force Base in Cheyenne Wyoming, where his unit was recognized as the "Best ICBM Squadron in Air Force Space Command." During Operation ALLIED FORCE, he served in the Combined Forces Air Component Commander's Strategy Cell and on the Guidance, Apportionment and Targeting Team. During Operation ENDURING FREEDOM, he served at USCENTCOM as a strategist on General Tommy Frank's staff and in the Space and Information Operations Element. He later served as the chief air and space power strategist in the Pentagon's Strategic Planning Council during Operation IRAQI FREEDOM.

2009-15: Director's Colloquium by Dr. Liane Guild

On Tuesday, July 28, at 2 p.m. in the Main Auditorium (N201), Dr. Liane Guild will present the eighth colloquium in the 2009 Director's Colloquium Summer Series entitled, "NASA's Airborne Remote Sensing of Coral Reefs." This presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially Ames summer students are cordially invited. This is an opportunity to learn about the changes that are occurring in our coastal reefs and how NASA is using remote sensing to interpret reef habitat variability and biodiversity.

Abstract: NASA's airborne science assets have been used to fly over strategic coral reef sites in Puerto Rico to collect high-resolution imagery to support coral reef ecosystem research. The goal of the research is to better understand how light scatters and reflects in shallow aquatic ecosystems specifically coral reefs, so that current and future remote sensing sensors and data can be optimized for ecosystem research in the coastal zone. Specifically, this work addresses the use of remote sensing and field data to interpret reef habitat variability and biodiversity in sites experiencing coral reef bleaching, disease, and intense wave action from hurricanes that may become more frequent due to climate change. The airborne sensors consist of a high-resolution digital camera system (DCS) and the Airborne Visible Infrared Imaging Spectrometer (AVIRIS), a hyperspectral sensor. Field measurements of benthic types including spectral properties and species composition are integrated with the AVIRIS data to interpret coral reef ecosystem biodiversity.

Biography: Dr. Liane Guild is an ecosystems research scientist in the Biospheric Science Branch in the Earth Science Division at NASA Ames Research Center. She received her Ph.D. from Oregon State University in 2000 in ecosystems ecology where she studied deforestation and fire in the Amazon and, in addition, she worked on a project studying upstream land use run off and predation impacts on the barrier reef off Belize. Currently, Liane is conducting research to map tropical coral reef ecosystems using NASA remote sensing data and is studying reef variability and change by linking in situ spectra and field data with airborne hyperspectral data. Liane has led two NASA AVIRIS airborne missions over Caribbean coral reefs in 2004 and 2005 and co-led an AVIRIS mission in the Pacific in 2005.

2009-16: Director's Colloquium by Dr. Carl Pilcher

On Tuesday, Aug. 4, at 2 p.m. in the Main Auditorium (N201), Dr. Carl Pilcher will present the ninth colloquium in the 2009 Director's Colloquium Summer Series entitled, "Astrobiology and Virtual Institutes." This presentation will be followed by a reception in the lobby of Building 200. All Ames employees, and especially our summer students, are invited to attend. This is an opportunity to learn about NASA's astrobiology program and the NASA Astrobiology Institute, which has been a pioneer in virtual methods of communication.

Abstract: Earth is the only planet in the universe that we know harbors life. Astrobiology's most immediate goal is to understand the potential for other life-bearing worlds. This requires bringing together a wide array of scientific disciplines, each of which addresses an aspect of the larger unknown. The study of life on Earth, particularly organisms that exist at extreme temperature, pressure, pH, salinity, radiation level, etc., informs us about the limits of life. The study of Earth's rock record tells us how life and its host planet co-evolve, and what external factors influenced that evolution. The study of interstellar molecules, circumstellar disks, and meteorites provides insights into how the ingredients for life may be formed and where in the universe they may be found. The exploration of planets in our own solar system allows us to apply our insights to the detailed study of other worlds. And the study of planets around other stars broadens our perspective on the scope of universal possibilities.

The NASA Astrobiology Institute (NAI) was formed just over a decade ago to promote collaborative, interdisciplinary research across these areas of science; cross-train a new generation of scientists to address astrobiology's challenges: provide scientific and technical leadership for astrobiology investigations on flight missions; and share the excitement of astrobiology with learners of all ages.

Biography: Dr. Carl Pilcher has had careers in both academia and NASA management. He received B.S. and Ph.D. degrees in chemistry from the Polytechnic Institute of Brooklyn and MIT, respectively. While still a graduate student, he led scientific teams that used ground-based astronomical observations to discover water ice in Saturn's rings and on three of Jupiter's Galilean satellites including Europa, now a high priority astrobiology exploration target because of its subsurface liquid water ocean. He subsequently spent 12 years as a faculty member at the University of Hawaii's Institute for Astronomy, where he discovered and analyzed "weather" on Neptune and studied the "Io Torus," a ring of neutrals and plasma surrounding Jupiter that originates in the volcanic emissions of its innermost Galilean Satellite, Io.

After receiving a mid-career master's degree from Princeton University's Woodrow Wilson School of Public and International Affairs, he began his NASA management career in 1988 as Science Director in the Office of Exploration. He subsequently held a series of science management positions at NASA Headquarters prior to moving to Ames in 2006 to become the third Director of the NAI.

2009-17: Director's Colloquium by Dr. Laura Iraci

On Tuesday, August 11th, at 2 p.m. in the Main Auditorium (N201), Dr. Laura Iraci will present the last colloquium in the 2009 Director's Colloquium Summer Series entitled, "Laboratory and General Circulation Model Studies of Cloud Formation on Mars." This talk will be followed by a reception in the lobby of Building 200. All Ames employees and especially our summer students are cordially invited. This is an opportunity to learn about the atmosphere on Mars.

Abstract: Computer models of the martian water cycle and climate show that ice cloud properties such as particle size and number distribution are crucial for an accurate understanding of the martian system. These cloud properties, in turn, depend on poorly understood nucleation parameters. We have performed laboratory experiments under martian temperature and water pressure conditions to determine ice onset conditions as a function of temperature and dust composition. Using infrared spectroscopy to monitor ice nucleation and growth, we find a significant barrier to ice formation and a pronounced temperature dependence. Below 175 K, significant supersaturation conditions may be required to nucleate water ice clouds on dust particles. Preliminary results from the Ames Mars General Circulation Model updated with the laboratory data will be presented. Changes are seen in both the atmospheric water content and the surface frost location and amount. In general, our laboratory findings suggest that cloud formation will be more difficult than previously thought, leading to drier conditions in the atmosphere and near-surface regions of Mars. These updates appear to produce better agreement between models and recent observations of the martian atmosphere. New lab results for water uptake and ice nucleation on JSC-1 Mars simulant will also be presented, and possible application of these data to the mesospheric clouds on Earth will also be discussed.

Bio: Dr. Laura Iraci is a research scientist in the Earth Science Division at NASA Ames Research Center, where she performs laboratory studies of the chemistry of aerosol particles and the microphysics of cloud formation. Following her Ph.D. in Analytical and Atmospheric Chemistry from the University of Colorado Boulder, where she studied the formation of the polar stratospheric clouds which lead to ozone depletion, she was a postdoctoral fellow at the National Center for Atmospheric Research. She received her undergraduate training at Colgate University in upstate New York.

2009-18: Director's Colloquium by Dr. Francis Everitt

On Tuesday, August 25th, at 2 p.m. in the Space Science Auditorium (N245), Dr. Francis Everitt will present a Director's Colloquium entitled, "Testing Einstein in Space: The Gravity Probe B Detective Story." This talk will be followed by a reception in the lobby outside the auditorium. All Ames employees and summer students are cordially invited.

Abstract: Einstein's theory of gravity, General Relativity, advanced in 1916 remains even today the most beautiful and least tested of all the theories of physics. The NASA Gravity Probe B Mission launched in April 2004 provides two vitally important new tests by means of gyroscopes orbiting around the Earth. It has engaged a fascinating intersection of physics and engineering challenges including four years of steadily progressing data analysis so full of twists and turns that we venture to call it the Gravity Probe B Detective Story.

In addition to all the subtleties of collaborations between the three worlds of NASA, university research, and aerospace industry, Gravity Probe B has involved an extraordinary number of physics and engineering students, yielding so far 85 doctoral dissertations at Stanford University, 14 at other universities, and extended research experience for 353 undergraduates from 11 different departments, and 55 high school students.

Bio: Francis Everitt has been a native Californian longer than the Governor of California. He obtained his PhD from Imperial College, London in paleomagnetism with among other things proof that in Carboniferous times, Britain was 10° south of the equator. Two years at the University of Pennsylvania then led to the discovery, with K. R. Atkins and A. Denenstein, of 3rd sound in superfluid He. At Stanford since October 1962, he has been engaged in space research, in particular the Gravity Probe B and STEP missions. He has also written extensively on the history of 19th and 20th (but not yet 21st) century physics including a biography of Maxwell and most recently an article "Kelvin, Maxwell, Einstein, and the Ether: Who was Right about What?" In 2005, he was awarded the NASA Distinguished Public Service Medal.

2009-19: Director's Colloquium by Dr. Elmar Fuchs

On Tuesday, Oct. 27, at 11 a.m. in the Space Sciences Auditorium (N245), there will be a Director's Colloquium by Dr. Elmar Fuchs entitled, "The Inner Structure of a Floating Water Bridge." This phenomenon where water forms a floating "bridge" when exposed to high voltage is not well understood. Fuchs will describe the current theories on the formation, the inner structure and the dynamics of the bridge. All of staff is cordially invited to attend.

Abstract: When high voltage is applied to distilled water filled into two beakers close to each other, a water connection forms spontaneously, giving the impression of a floating water bridge. This phenomenon is of special interest, since it comprises a number of phenomena currently tackled in modern water science. The first data on neutron scattering of a floating heavy water bridge and the preliminary results of inelastic UV scattering seem to support the 'bubble hypothesis' suggested earlier. These measurements can be interpreted in accordance with the presence of electrically induced cavitation nano bubbles. The quantum field theory prediction of coherent domains cannot be excluded either, since such domains would reveal similar neutron scattering characteristics. However, since both nano bubbles and coherent domains are said to carry charge, an electrostatic mesoscopic network formed by either of them can be held directly responsible for the stability of the bridge and may thus explain one key feature of the phenomenon.

Biography: Dr. Elmar Fuchs is a scientific project manager and researcher at Wetsus - Centre of Excellence for Sustainable Water Technology, Leeuwarden, The Netherlands. He received his Ph.D. at the Graz University of Technology. His thesis was entitled "Spectroscopy and Colour Rendering of some Rare Earth Ions in Yttrium Aluminum Borate Single Crystals". At the Westus Center of Sustainable Water Technology, his research interests include the floating water bridge, preconventional water treatment, electrospray desalination, and the aqueous dynamics at a gel/liquid interface.

Director's Colloquia (2010)

- 2010-1 (1/26/2010) Dr. Jonathan Trent
OMEGA and the Future of Aviation Fuels
- 2010-2 (2/17/2010) Nichelle Nichols
NASA - What's in It for Me?
- 2010-3* (3/10/2010) Sir Roger Penrose
Aeons Before the Big Bang?
- 2010-4 (3/30/2010) Dr. Mark Giampapa
Astrophysics with the Advanced Technology Solar Telescope
- 2010-5 (3/31/2010) Dr. Tiago Pereira
3D Models as New Paradigm in Stellar Atmospheres: Trusting their Results and Understanding the Solar Atmosphere
- 2010-6* (4/22/2010) Dr. Richard Luthy
Facing Scarcity: California's Urban Water Challenges
- 2010-7 (5/11/2010) Dr. Joseph Francisco
The Joys of Chemistry and the Challenges Ahead.
- 2010-8* (6/8/2010) Dr. Darlene Lim
Pavilion Lake Research Project: Using Underwater Field Science to Prepare Humans for Future Planetary Exploration
- 2010-9* (6/15/2010) Dr. Anthony Colaprete
Results from the LCROSS Experiment
- 2010-10* (6/22/2010) Dr. Kai Goebel
When will it Break? Prognostics and Health Management in Aeronautics and Space Applications
- 2010-11* (6/29/2010) Dr. Natalie Batalha
Catching Shadows: Kepler's Search for New Worlds
- 2010-12* (7/6/2010) Dr. Ramakrishna Nemani
Earth Science Collaborative for Ecological Forecasting

- 2010-13 (7/13/2010) Dr. S. Pete Worden
Protecting Earth from Asteroids
- 2010-14* (7/20/2010) Laura Kushner
Experimentation in Aerodynamics
- 2010-15* (7/21/2010) Dr. Nigel Packham
The Columbia Crew Survival Investigation Report – What happened to the STS-107 Columbia crew and what can be learned from it
- 2010-16* (7/27/2010) Dr. Tori Hoehler
A ‘Follow the Energy’ Approach in Astrobiology
- 2010-17* (8/3/2010) Dr. Andrew Watson
Vision Science and Visual Technology
- 2010-18* (8/10/2010) Dr. Stuart Rogers
Aerodynamics and Debris Transport for the Space Shuttle Launch Vehicle
- 2010-19* (8/17/2010) Peter Thoeny
Structured Wikis at Work - Enterprise 2.0 in Action.
- 2010-20 (9/28/2010) Dr. Jeff Cuzzi
Two Easy Pieces: Saturn’s Rings and Planetesimal Formation
- 2010-21 (10/14/2010) Dr. Andrew Pohorille
The Quest for Efficient Methods to Calculate Free Energies: Bridging Statistical Mechanics and Molecular Biology
- 2010-22 (12/9/2010) Dr. Peter McCullough
Characterization of Transiting Extrasolar Planets with Spitzer and Hubble
- 2010-23 (12/9/2010) Dr. Peter McCullough
Reliable and Affordable Wireless Delivery of Fusion Power to your Home: why I have Solar Panels and you will too

*Denotes that the colloquium is available on DVD in the library

2010-1: Director's Colloquium by Dr. Jonathan Trent

On Tuesday, Jan. 26, at 3 p.m. in the Space Sciences Auditorium (N245), Dr. Jonathan Trent will present a Director's colloquium entitled, "OMEGA and the Future of Aviation Fuels." This talk will be followed by a wine and cheese reception in the lobby outside the auditorium. All Ames employees are cordially invited.

Abstract: Offshore Membrane Enclosures for Growing Algae (OMEGA) is an innovative approach to growing oil-producing, freshwater algae in offshore enclosures, using municipal wastewater that is currently dumped into the ocean at a rate of >35 billion gals/day. The offshore location and the use of municipal wastewater mean that OMEGA does not compete with agriculture for land, freshwater or fertilizer. By cultivating freshwater algae that cannot survive in the ocean, OMEGA leaks will have minimal environmental impact and it uses forward osmosis to concentrate nutrients that stimulates algal growth, while removing up to 80 percent of the bulk water to facilitate harvesting. In a typical OMEGA system, the modules float in saltwater and release forward-osmosis treated (clean) water into the surrounding saltwater. OMEGA has multiple sources of potential revenue contributing to its return on investment: 1) production of biofuels, fertilizer and other valuable algae products, 2) wastewater processing and 3) carbon sequestration. Trent will discuss the results of laboratory experiments and small-scale field tests, as well as some of the challenges that remain to making this a large-scale technique for producing aviation fuel.

Biography: After receiving his Ph.D. in biological oceanography at Scripps Institution of Oceanography studying marine microbiology, Trent spent six years in Europe studying biochemistry and molecular biology. He returned to the U.S. to work at the Boyer Center for Molecular Medicine at Yale Medical School for two years before establishing a biotechnology group at Argonne National Laboratory. In 1998, he moved to NASA Ames Research Center to be part of NASA's Astrobiology program. For many years, Trent has been studying the molecular adaptations of extremophiles, specifically heat-shock proteins that live in extreme environments. In 2007, Trent initiated the Global Research into Energy and the Environment at NASA (GREEN) team in collaboration with Google. Currently, he is serving as principal investigator of the OMEGA project.

2010-2: Director's Colloquium by Nichelle Nichols

On Wednesday, Feb. 17, at 1 p.m. in the Main Auditorium (N201), Nichelle Nichols, actress best known for her portrayal of Lt. Uhura of Star Trek's USS Enterprise, will present a Director's Colloquium entitled "NASA - What's in It for Me?" Nichols will discuss how she successfully helped NASA recruit the first women and minority astronauts for the Space Shuttle Program, for which she received NASA's distinguished Public Service Award. Her presentation will shed light on how NASA can better inspire the next generation and encourage students to pursue careers in Science, Technology, Engineering and Mathematics (STEM). After the colloquium, there will be light refreshments from 2-2:30 p.m. outside the Main Auditorium (N201) compliments of the NASA Ames Exchange. The Ames community is cordially invited to both events.

Biography: When Nichols was cast by Gene Roddenberry to create Chief Communications Officer Lt. Uhura, fourth in command of the Starship Enterprise in his legendary TV Series Star Trek, hers became, in the words of Dr. Martin Luther King, "the first non-stereotypical role portrayed by a black woman in television history." Nichols subsequently co-starred in six blockbuster Star Trek motion pictures. She was honored in a special exhibit at the Smithsonian's National Air and Space Museum in Washington D.C. along with her other command crew members of the Starship Enterprise. Among her many notable TV and film credits, Nichols co-starred with Cuba Gooding Jr. and James Coburn in the Disney motion picture Snow Dogs, with Ron Perlman and Daniel Riordan in the TV film Captain Zoom in Outer Space, and with Maxwell Caulfield and LeVar Burton in the Sandy Howard film The Supernaturals, as well as singing and dancing with Sammy Davis, Jr. in Porgy and Bess. Her more recent work involves independent features including This Bitter Earth, Tru Loved, The Torturer, and Lady Magdalen's, which showcases two original compositions written by Nichols. She most recently joined the cast of the NBC blockbuster television series Heroes. Nichols continues as a member of the advisory board of the International Space Camp. Among her many accomplishments, Nichols was selected in 2004 as one of the International Human Rights Consortium's Fete d'Excellence Laureates.

2010-3: Director's Colloquium by Sir Roger Penrose

On Wednesday, March 10, at 2 p.m. in the Space Sciences Auditorium (N245), Sir Roger Penrose will present a Director's colloquium entitled "Aeons Before the Big Bang?" This talk will be followed by a wine and cheese reception in the lobby outside the auditorium. All Ames employees are cordially invited. Seating is limited in the auditorium, so plan to arrive early to ensure a seat.

Abstract: The cosmic microwave background (CMB) provides much of the impressive evidence for an enormously hot and dense early stage of the universe referred to as the Big Bang, but was this singular event actually the absolute beginning? Observations of the CMB are now very detailed, but this very detail presents new puzzles, one of the most blatant being an apparent paradox in relation to the Second Law of thermodynamics. The hypothesis of inflationary cosmology has long been argued to explain away some of these puzzles, but it does not resolve some key issues, including that raised by the Second Law. In this talk, I describe a quite different proposal, which posits a succession of universes aeons prior to our own. The expansion of the universe never reverses in this scheme, but the space-time geometry is nevertheless made consistent through a fundamental role for conformal geometry. Black-hole evaporation turns out to be central to the Second Law. Some recent analysis of CMB data, obtained from the WMAP satellite provides a tantalizing input to these issues.

Biography: Sir Roger Penrose is an English mathematical physicist and Emeritus Rouse Ball Professor of Mathematics at the Mathematical Institute, University of Oxford and Emeritus Fellow of Wadham College. Penrose also is the Francis and Helen Pentz Distinguished (visiting) Professor of Physics and Mathematics at Pennsylvania State University. He has received many prizes for his contribution to science, including the 1988 Wolf Prize for physics, which he shared with Stephen Hawking for their contribution to our understanding of the universe. In 1994, Penrose was knighted for services to science. Penrose has written many books, the most recent being "The Road to Reality: A Complete Guide to the Laws of the Universe," a 1,099-page book aimed at giving a comprehensive guide to the laws of physics. Sir Roger Penrose is world renowned for his work in mathematical physics, in particular his contributions to general relativity and cosmology.

2010-4: Director's Colloquium by Dr. Mark Giampapa

On Tuesday, March 30, at 3 p.m. in the Space Sciences Auditorium (N245), there will be a Director's Colloquium by Dr. Mark Giampapa entitled, "Astrophysics with the Advanced Technology Solar Telescope." After the colloquium there will be a reception in the lobby outside the auditorium. All of staff is cordially invited.

Abstract: The scientific specifications of the Advanced Technology Solar Telescope (ATST) in the areas of spectropolarimetric precision and low scattered light not only will lead to revolutionary advances in solar physics but also have the promise for innovative applications in other realms of astrophysics. These include the application of high-precision polarimetry in the investigation of circumstellar regions in young or evolved stars, the regions around active galactic nuclei, and the characterization of extrasolar planetary systems. The ATST can offer a unique platform for dedicated programs in solar-stellar physics that require long-term monitoring or large-scale surveys. Some areas of application include asteroseismology to determine the fundamental parameters in stars with significantly higher precision; the measurement of stellar convection; and, the measurement of stellar magnetic fields and their variation over short-term and decadal time scales as a critical input for the development of dynamo theory. These frontier areas and the potential role of the ATST in each will be discussed.

Biography: Dr. Mark Giampapa serves as the Deputy Director for the National Solar Observatory (NSO) with specific responsibility for the Tucson/Kitt Peak program. In this role, he has overview responsibilities for the scientific and instrument development activities at NSO/Tucson, including the Synoptic Optical Long-term Investigations of the Sun (SOLIS) project, and the conduct and support for observing programs at the NSO McMath-Pierce Telescope Facility on Kitt Peak.

2010-5: Director's Colloquium by Dr. Tiago Pereira

On Wednesday, March 31, at 3 p.m. in the Space Sciences Auditorium (N245), there will be a Director's Colloquium by Dr. Tiago Pereira entitled, "3D Models as New Paradigm in Stellar Atmospheres: Trusting their Results and Understanding the Solar Atmosphere." After the colloquium there will be a reception in the lobby outside the auditorium. All of staff is cordially invited.

Abstract: Dr. Pereira will discuss the new 3D hydrodynamic models of stellar atmospheres and how they can be used to derive reliable parameters of stars, such as chemical composition. He will discuss aspects of his PhD work where he systematically tested 3D models of the solar photosphere against several observations. He also will discuss the controversy surrounding the chemical composition of the sun itself.

Bio: Dr. Tiago M. D. Pereira is currently a post-doc at the Research School of Astronomy and Astrophysics, at the Australian National University in Canberra. His work revolves around observations and modeling, and his PhD thesis was a comparison of 3D solar model atmospheres with observations. His research interests include convection and its effects on solar and stellar abundance analysis, line formation in stellar atmospheres, chemical abundances in the universe and diagnostics of the solar photosphere. Other interests include thermal structure, dynamics, magnetism, supercomputing, parallel computing, 3D visualization, image processing algorithms and efficient data reduction pipelines.

2010-6: Director's Colloquium by Dr. Richard Luthy

As part of Ames' Earth Day celebrations, on Thursday, April 22, at 2 p.m. in the Main Auditorium (N201), there will be a Director's Colloquium by Dr. Richard Luthy, of Stanford University entitled, "Facing Scarcity: California's Urban Water Challenges". After the colloquium there will be a reception in the lobby of Building N200. All of staff is cordially invited.

Abstract: California cities are facing a mounting water crisis from climate change, population expansion, ecosystem demands and deteriorating infrastructure that threatens economic development, social welfare, and environmental sustainability. Without relatively large investments this crisis will only deepen through the 21st century. Accordingly, we need to advance new strategies for water/wastewater treatment and distribution that will eliminate the need for imported water, recover resources from wastewater, and generate rather than consume energy in the operation of urban water infrastructure while simultaneously enhancing urban aquatic ecosystems. This presentation will explore some of the history of California's water development, discuss myths about California water that influence debates on the future of our water management, and present some solutions to our water crisis that include developments in both engineered and managed natural water systems, and advances in systems integration and institutions.

Bio: Dr. Richard Luthy is the Silas H. Palmer Professor of Civil and Environmental Engineering at Stanford University. His teaching and research focus is environmental engineering and water quality. His research interests include physicochemical processes and applied aquatic chemistry with application to waste reduction and treatment, and remediation of contaminated soil and sediment. Current projects address the phase partitioning, treatment, and fate of persistent hydrophobic organic compounds. He holds a Ph.D. in Civil Engineering, from the University of California, Berkeley. His impressive list of awards includes being elected to membership in the National Academy of Engineering (1999).

2010-7: Director's Colloquium by Dr. Joseph Francisco

On Tuesday, May 11, at 2 p.m. in the Space Sciences Auditorium (N245), Dr. Joseph Francisco will present a Director's Colloquium entitled "The Joys of Chemistry and the Challenges Ahead." This presentation will be followed by a wine and cheese reception in the lobby outside the auditorium. All Ames employees are cordially invited to attend.

Abstract: This presentation provides an overview of research developments in atmospheric chemistry. The lessons learned from chemistry in Earth's atmosphere provide valuable insight into chemistry of other planets in our universe, such as Mars. The HOCO radical, which is a key intermediate that has an important role in the atmospheric oxidation of CO to CO₂, will be highlighted as an example. The dynamics and kinetics of the reactions of the HOCO radical with a variety of collision partners as studied by *ab initio* and molecular dynamics methods will be presented. More importantly, the impact of HOCO chemistry in Earth and Mars environments will be discussed. This presentation will also provide an overview of issues impacting the chemical enterprise, our competitiveness in the global marketplace, and how the American Chemical Society can play a leadership role in moving the chemical enterprise forward into the future.

Biography: Dr. Joseph Francisco is the 2010 President of the American Chemical Society and the William E. Moore Distinguished Professor of Chemistry and Earth and Atmospheric Sciences at Purdue University. Research in his laboratory focuses on basic studies in spectroscopy, kinetics and photochemistry of novel transient species in the gas phase. These species play an important role in atmospheric, biochemical and combustion processes. Theoretical and experimental methods are used cooperatively in extending spectroscopic information on these species. His degrees include a Ph.D. from Massachusetts Institute of Technology (1983) and an Honorary Doctor of Science degree from Tuskegee University (2010).

2010-8: Director's Colloquium by Dr. Darlene Lim

On Tuesday, June 8, at 2 p.m. in the Main Auditorium (N201), Dr. Darlene Lim will present the first colloquium in the 2010 Director's Colloquium Summer Series entitled, "Pavilion Lake Research Project: Using Underwater Field Science to Prepare Humans for Future Planetary Exploration." This presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Analog field science and exploration research can approximate the Earth's past as well as humanity's future in space. Analog field research affords the opportunity to study modern terrestrial systems and acquire geochemical, physical, technical, social and other data relatable to historical or future scenarios that cannot be accessed directly. Such is the case with the research of the Pavilion Lake Research Project (PLRP).

The PLRP – a multi-disciplinary, science and exploration endeavor – focuses on understanding the morphogenesis of modern microbialites in Pavilion Lake, British Columbia, Canada. Microbialite is a general term used to describe organo-sedimentary structures, which include stromatolites that are commonly formed through the trapping and binding of sediment and/or mineralization of microbes. By characterizing the biological and physiochemical controls that influence the development of microbialites in Pavilion Lake, we are afforded an opportunity to test hypotheses related to factors that controlled the distribution and occurrence of microbialites in the fossil record.

Over the years, the PLRP has employed a suite of lab and field based methods to accomplish their scientific and exploration goals. In doing so, it became apparent that this project presented another analog application – human planetary exploration. The project's field research demands the seamless integration of science and exploration field activities in an underwater environment inherently hostile to humans. The physical, mental and operational rigors associated with PLRP field science and exploration activities are comparable to extra-vehicular activities (EVA) where scientific exploration is a key driver.

Darlene will present a synopsis of the analog science and exploration activities at Pavilion Lake and discuss the forthcoming 2010 field season that is weeks away from commencing.

Biography: Darlene is a limnologist based at the NASA Ames Research Center and the SETI Institute. She has spent over a decade conducting earth science and astrobiology research around the world. She has been involved in Mars and Lunar analog research for numerous years. Some of the larger analog programs she has contributed to include the Haughton Mars Project, Desert RATs, and the Pavilion Lake Research Project. She is currently the Principal Investigator of the Pavilion Lake Research Project (PLRP) (www.pavilionlake.com).

2010-9: Director's Colloquium by Dr. Anthony Colaprete

On Tuesday, June 15, at 2 p.m. in the Main Auditorium (N201), Dr. Anthony Colaprete, will present the second colloquium in the 2010 Director's Colloquium Summer Series entitled, "Results from the LCROSS Experiment." Anthony Colaprete is the principal investigator on the Lunar Crater Observation and Sensing Satellite (LCROSS) project, an extremely successful mission that has provided new insights into the presence of volatiles on the moon's surface. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: On Oct. 9, 2009, at approximately 11:31:19 UTC the Lunar Crater Observation and Sensing Satellite (LCROSS) Centaur impacted within about 100 meters of the planned target on the moon. The impact resulted in an ejecta cloud that was observed to expand to over 10 km across and to a height of more than 15 km above the surface. All instruments on the LCROSS spacecraft performed well and a wealth of data was collected. All portions of the impact, including the flash, ejecta curtain and resulting crater, were observed. From the data the presence of water ice was confirmed, as was the presence of several other compounds. In this presentation an overview of the results will be presented.

Biography: Dr. Anthony (Tony) Colaprete received his B.A in physics from the University of Colorado in 1992, and his Ph.D in astrophysical, planetary and atmospheric science from the University of Colorado in 2000. Colaprete has worked on a variety of space projects ranging from sounding rocket and space shuttle flights, to micro and small satellites. He has contributed to various projects at Ames including the Pascal Scout Mission for which he is the deputy principal investigator, the Mars Polar Drill Scout mission for which he is leading the effort on the meteorology package, and the Lunar Robotic program for which he is the science/payload lead on one of the Ames proposals. This is all in addition to his role as principal investigator on LCROSS.

In addition to his project and instrumentation work, Colaprete is internationally recognized for his work on the nature of the Martian climate system. He has developed state-of-the-art cloud microphysical schemes and incorporated them into the NASA/Ames Mars General Circulation Model. He has used these models to show that carbon dioxide ice clouds on early Mars warm the surface through a scattering greenhouse process, but not to the levels previously thought. He has shown that impact events on early Mars can dramatically alter the planet's climate system and could provide an explanation for many of the fluvial features.

2010-10: Director's Colloquium by Dr. Kai Goebel

On Tuesday, June 22, at 2 p.m. in the Main Auditorium (N201), Dr. Kai Goebel, will present the third colloquium in the 2010 Director's Colloquium Summer Series entitled, "When will it Break? Prognostics and Health Management in Aeronautics and Space Applications." This is an opportunity to learn about some of the world-class research that is being performed in the Intelligent Systems Division at Ames Research Center. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: To ensure mission success, NASA has at its disposal a suite of tools and methods. These include the use of reliable components that are designed to ensure that mean time between failure satisfies mission requirements. Next, hardware redundancy is employed to provide backup capability of critical components. Active health management can be carried out where autonomous online component performance monitoring is performed and where indications of abnormal behavior are determined. This talk centers around the advanced capability of this technology. Questions that we try to answer include: How does one detect the early onset of faults with limited sensing? How does one ensure that sensor misbehavior does not throw off the analysis? How does one determine when a component will fail? The talk will illuminate the past, present, and future of this field with a number of examples.

Biography: Goebel holds M.S. (1993) and Ph.D. (1996) degrees in mechanical engineering from the University of California at Berkeley. He is the director of the Prognostics Center of Excellence at NASA Ames Research Center and the associate principal investigator for Prognostics for NASA's Integrated Vehicle Health Management Program. Before joining Ames, he spent a decade at General Electric Corporate R&D. He has co-authored more than 150 papers and holds 13 patents in the area of systems health management.

2010-11: Director's Colloquium by Dr. Natalie Batalha

On Tuesday, June 29, at 2 p.m. in the Main Auditorium (N201), Dr. Natalie Batalha will present the fourth colloquium in the 2010 Director's Colloquium Summer Series entitled, "Catching Shadows: Kepler's Search for New Worlds." The Kepler mission is NASA's first mission capable of finding Earth-size and smaller planets around other stars. The results from this Discovery-class mission will allow us to place our solar system within the continuum of planetary systems in the galaxy. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Humankind's speculation about the existence of other worlds like our own has turned into a veritable quest with the launch of NASA's Kepler spacecraft in March 2009. The mission is designed to survey a slice of the Milky Way Galaxy to identify planets as small as Earth in or near the habitable zone and determine their frequency. Dr. Batalha will describe the techniques employed by Kepler to identify Earth-like planets and share the tantalizing first results that have been released after just one year of operations.

Biography: Dr. Natalie Batalha is a professor of physics and astronomy at San Jose State University in the heart of Silicon Valley, California and co-investigator on NASA's Kepler Mission. She holds a bachelor's in physics from the University of California (UC), Berkeley, and a doctorate in astrophysics from UC Santa Cruz. Dr. Batalha started her career as a stellar spectroscopist studying young, sun-like stars. After a post-doctoral fellowship in Rio de Janeiro, Brazil, Dr. Batalha returned to California. Inspired by the growing number of exoplanet discoveries, she joined the team led by William Borucki at NASA's Ames Research Center working on transit photometry -- an emerging technology for finding exoplanets. Eleven years later, she stands poised with the Kepler team to make discoveries that humans, up to now, have left to the imagination and the realms of science fiction.

2010-12: Director's Colloquium by Dr. Ramakrishna Nemani

On Tuesday, July 6, at 2 p.m. in the Main Auditorium (N201), Dr. Ramakrishna Nemani will present the fifth colloquium in the 2010 Director's Colloquium Summer Series entitled, "Earth Science Collaborative for Ecological Forecasting." This work has the potential to revolutionize the way we use NASA satellite data to improve the efficient use of natural resources such as water in agriculture, as well as to develop climate mitigation strategies. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Earth observing satellites from NASA and other international space agencies collect every day several terabytes of data about oceans, land, and the atmosphere. However, access to these datasets and the computing resources required to analyze them are limited. To address this problem, Ames is building the NASA Earth Exchange (NEX), a collaborative compute platform for the Earth science community, creating new ways for scientific interaction and knowledge sharing. Funded through the American Recovery and Reinvestment Act, NEX combines state-of-the-art supercomputing, Earth system modeling, workflow management, NASA remote sensing data feeds, and a social networking platform to deliver a complete work environment in which users can explore and analyze large datasets, run modeling codes, collaborate on new or existing projects, and quickly share results among Earth science communities. A primary focus of NEX is the integration of ground, airborne and satellite observations with weather, climate, and ecosystem models to produce ecological forecasts, biological equivalents of climate forecasts. Robust ecological forecasts developed through community participation are an important component of improving the efficiency of natural resources use such as better water management in agriculture and for developing climate mitigation strategies.

Biography: Ramakrishna Nemani is a research scientist with the Biospheric Sciences Branch at NASA Ames Research Center, where he directs the Ecological Forecasting Lab. Prior to arriving at NASA Ames in 2003, he was a research professor at the University of Montana. He has published over 130 peer-reviewed papers in ecology, climatology and remote sensing. He is a team member of the Earth Observing System and Landsat Data Continuity Missions. He has received several awards at Ames, including the NASA Exceptional Scientific Achievement award in 2008.

2010-13: Director's Colloquium by Dr. S. Pete Worden

On Tuesday, July 13, at 2 p.m. in the Main Auditorium (N201), Ames Center Director Dr. S. Pete Worden will present the sixth colloquium in the 2010 Director's Colloquium Summer Series entitled, "Protecting Earth from Asteroids." There has been growing interest and attention by the public and the scientific community in identifying potentially hazardous asteroids and considering mitigation strategies. Congress has assigned NASA these tasks. In this talk, Worden will review the current status of these studies and programs, as well as introduce some future possibilities and issues. This talk will be followed by a reception in the lobby of Building 200. All Ames employees, and especially our summer students, are cordially invited to attend. This is an opportunity to learn about what can be done to protect the planet from asteroid impacts.

Biography: Dr. Simon P. Worden (Brig. Gen., USAF, ret.) is the director of NASA Ames Research Center. Prior positions for Worden include: research professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona; director of Development and Transformation, Space and Missile Systems Center, Air Force Space Command; Consultant to the Defense Advanced Research Projects Agency (DARPA) on space-related issues; Congressional Fellow with the Office of Senator Sam Brownback as advisor on NASA and space issues; staff officer for the President's National Space Council. Worden spearheaded efforts to revitalize U.S. civil space exploration and Earth-monitoring systems. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences and strategic studies, served as a scientific co-investigator for two NASA space science missions and is a recognized expert on space issues – both civil and military. Worden retired in 2004 after 29 years of active service in the United States Air Force.

2010-14: Director's Colloquium by Laura Kushner

On Tuesday, July 20, at 2 p.m. in the Main Auditorium (N201), Laura Kushner will present the seventh colloquium in the 2010 Director's Colloquium Summer Series entitled, "Experimentation in Aerodynamics." This is an opportunity to learn about some of the cool work we do in the wind tunnels at Ames Research Center. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees, and especially our Ames summer students, are cordially invited.

Abstract: The Fluid Mechanics Laboratory (FML) at NASA Ames Research Center uses a variety of advanced measurement techniques to investigate the flow around models of aeronautical and aerospace interest. This presentation will give an overview of some of the techniques commonly used by members of the FML and how these techniques are combined to get a complete picture of what is happening around and on the object of interest. Techniques include: Pressure Sensitive Paint, Schlieren, Background Oriented Schlieren, Particle Image Velocimetry, and Fringe Imaging Skin Friction. Projects include: CEV (Orion), FAITH, Peregrine Rocket, Space Shuttle, Mars Science Lab (MSL) and Truck/Coal Car Aerodynamics.

Biography: Laura Kushner received her BS in physics and astronomy from the University of Washington in 2007. She first came to Ames as an intern, and was hired full-time when she graduated. At Ames, Kushner focuses on optical methods for making aeronautical measurements. She has worked on numerous projects including Orion, Mars Science Laboratory, LCROSS and various rotorcraft projects.

2010-15: Director's Colloquium by Dr. Nigel Packham

On Wednesday, July 21, at 2 p.m. in the Main Auditorium (N201), Dr. Nigel Packham, will present a Director's Colloquium entitled "The Columbia Crew Survival Investigation Report – What happened to the STS-107 Columbia crew and what can be learned from it." Following the colloquium, there will be a reception in the lobby of N200. All of staff, and all of our students, are invited.

Abstract: The presentation will provide a background of the Columbia crew survival investigation, the timeline of the accident and will discuss several of the key findings that may have application to future spacecraft designers. The report contains 30 recommendations drawn from findings using multiple sources of evidence including telemetry, video analysis, ballistics and debris analysis. These recommendations are intended to increase the likelihood of crew survivability for both current and future spacecraft designs. See <http://www.nasa.gov/reports> for further details

Biography: Dr. Nigel Packham is currently serving as the deputy manager of the Extravehicular Activity Office in a rotational role. Prior to his rotation, he served as the associate director, technical, of JSC's Safety and Mission Assurance Directorate. He also served as the deputy manager for the Flight Safety Office in the same organization, which has responsibility for implementation of the Governance Model (Technical Authority) for all Human Spaceflight Programs. He was the project manager for the effort that culminated in the release of the Columbia Crew Survival Investigation Report, the subject of today's presentation. He started his career at NASA in the Engineering Directorate working on Systems. In this position he also served as the commander of a four-person crew that spent 91 days inside a six-meter diameter chamber to demonstrate the capabilities of advanced systems for air, water and waste recovery for long-duration missions.

2010-16: Director's Colloquium by Dr. Tori Hoehler

On Tuesday, July 27, at 2 p.m. in the Main Auditorium (N201), Dr. Tori Hoehler will present the eighth colloquium in the 2010 Director's Colloquium Summer Series entitled, "A 'Follow the Energy' Approach in Astrobiology." This is an opportunity to learn about some of the work we do in astrobiology at Ames Research Center. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees, and especially our Ames summer students, are cordially invited.

Abstract: The core astrobiology concepts of habitability and biosignatures are presently conceived in largely empirical terms, by reference to the Earthly example of life. Recent progress and coming challenges in astrobiological exploration illustrate a need to transition from an empirical to a mechanistic and quantitative understanding of these concepts. One approach for doing so places life in the context of energy flow – all life requires energy (a constraint on habitability), and life as we know it “manages” energy flow in ways not found in abiotic processes (a form of biosignature). This perspective holds potential to add quantitative rigor, by enabling thermodynamic descriptions of habitability and biosignatures, while also avoiding some of the bias that may result from extensive reference to terrestrial life. In current work, a “follow the energy” approach is being applied to understanding habitability in the Martian subsurface, and the utilization of “disequilibrium” as a biosignature for exoplanetary atmospheres.

Biography: Dr. Hoehler received his B.S. in Chemistry (1992) and Ph.D. in Marine Chemistry (1998) at the University of North Carolina at Chapel Hill. Tori Hoehler has been a part of the Exobiology Branch at Ames since 1998, first as an NRC postdoctoral fellow, and subsequently as a staff scientist. With a background in chemistry and oceanography, he now studies microbial community dynamics in extreme and analog environments, from the deep sea floor to the high arctic. His work focuses on the relationship between life and energy flow, particularly as it bears on the core astrobiology concepts of habitability and biosignatures. Tori is a Fellow of the California Academy of Sciences, where he also serves as a science advisor for content development, a Kavli Frontiers of Science Fellow, and was the American Geophysical Union's Carl Sagan Lecturer for 2009.

2010-17: Director's Colloquium by Dr. Andrew Watson

On Tuesday, Aug. 3, at 2 p.m. in the Main Auditorium (N201), Dr. Andrew Watson will present the ninth colloquium in the 2010 Director's Colloquium Summer Series entitled, "Vision Science and Visual Technology." This is an opportunity to learn about some of the research going on in the Human Systems Integration Division at Ames Research Center. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: As our primary means of gathering information from the world, visual perception is a key focus of human factors research. This is especially true in space and aviation, as humans attempt to navigate through complex and dangerous environments, relying upon direct vision and visual displays. At Ames Research Center, we have addressed this challenge by building computational models of human vision, and applying them to important problems in visual human factors. In this talk I will give a brief summary of the most significant aspects of human vision and show how they can be modeled. I will then show how the models can be used to answer critical questions about human visual performance, and to optimize visual technologies, such as visual displays, digital images, and digital video.

Biography: Andrew B. Watson attended Columbia University and received a PhD in psychology from the University of Pennsylvania in 1976. He subsequently did postdoctoral work at the University of Cambridge in England and at Stanford University in California. Since 1980 he has worked at NASA Ames Research Center in California, where he is the Senior Scientist for Vision Research, and where he works on models of vision and their application to visual technology. He is the author of over 100 scientific papers on human vision, visual neuroscience, image quality, and digital imaging. He has five patents, in image compression, video quality, and detection of artifacts in display manufacturing. In 2001, he founded the Journal of Vision (<http://journalofvision.org>), where he now serves as Editor-in-Chief. Dr. Watson is a Fellow of the Optical Society of America, a Fellow of the Association for Research in Vision and Ophthalmology, and a Fellow of the Society for Information Display. In 1990, he received from NASA the H. Julian Allen Award for outstanding scientific paper, and in 1993 he was appointed Ames Associate Fellow for exceptional scientific achievement. He is the 2007 recipient of the Otto Schade Award from the Society for Information Display, and the 2008 winner of the Special Recognition Award from the Association for Research in Vision and Ophthalmology.

2010-18: Director's Colloquium by Dr. Stuart Rogers

On Tuesday, August 10th, at 2 p.m. in the Main Auditorium (N201), Dr. Stuart Rogers will present the last colloquium in the 2010 Director's Colloquium Summer Series entitled, "Aerodynamics and Debris Transport for the Space Shuttle Launch Vehicle." This is an opportunity to learn about some of the work Ames does in support of the Space Shuttle Program. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: This talk will give an overview of work for the Space Shuttle program analyzing the ascent aerodynamics of the Space Shuttle Launch Vehicle (SSLV) and in developing and applying debris analysis tools. Growth over the past two decades of the NASA supercomputer facilities at Ames, together with maturity and capability of NASA computational simulation capabilities has advanced the ability to add significant detail to the computational models of the SSLV. This ability was used during the investigation of the loss of the Columbia Space Shuttle due to foam-debris damage, and during subsequent return-to-flight efforts. This effort included the use of computational simulations to develop aerodynamic models for foam, ice, and other types of debris. Debris analysis has included evaluation of all possible ice debris from the External tank, leading to a new launch-commit criteria for the formation of ice during the final inspection. The current support for the Space Shuttle debris team includes working from the Mission Control Center at JSC during the final countdown for each Shuttle mission.

Biography: Stuart Rogers works in the NASA Advanced Supercomputing Division, and has worked at NASA Ames Research Center for the past 21 years developing and applying computational fluid dynamics (CFD) software tools. He began his career working in the area of incompressible flow, authoring the INS2D and INS3D CFD codes and applying them to problems in propulsion, hydrodynamics, and bio-fluid flows. He then moved into high-lift aerodynamics analysis, and the development of overset-grid software tools. Since the 2003 Columbia accident he has been working for the Space Shuttle Program, performing computations studying ascent aerodynamics and debris analysis. During the past two years he has also been performing aerodynamic analysis of the Launch Abort System for the Orion vehicle. He obtained his B.S. (1983) and M.S. (1985) in Aerospace Engineering from the University of Colorado, and Ph.D. (1989) in Aeronautics and Astronautics from Stanford. Dr. Rogers has received two NASA Medals for Exceptional Engineering Achievement, the Ames Honor Award for Engineer, the Ames Honor Award for Scientist; he received the NASA Software of the Year Award in 1994 as well as honorable mention for NASA Software of the Year Award in 1998, and was a recipient of the Arthur Flemming Award in 2000.

2010-19: Director's Colloquium by Peter Thoeny

On Tuesday, Aug. 17, at 1 p.m. in the main auditorium (N-201), Peter Thoeny will present a Director's Colloquium entitled "Structured Wikis at Work - Enterprise 2.0 in Action." Following the colloquium, there will be a reception in the lobby of N200. Everyone including our summer students are cordially invited. Note the 1 p.m. start time.

Abstract: A wiki enables teams to organize and share content and knowledge in an organic and free manner, and to schedule, manage and document their daily activities. Learn from the founder of TWiki, the leading open source enterprise Wiki what exactly a wiki is, and how you can use it to enhance the communications within your organization and between organizations. Learn also how a structured wiki can bring Enterprise 2.0 into the workplace. Specifically he will address such topics as enterprise collaboration, what is a structured Wiki, collaboration challenges in the workplace, and how to deploy and overcome barriers to adoption of wikis.

Bibliography: Peter Thoeny is the founder of the TWiki Enterprise Collaboration platform and has lead the open-source project for 11 years. He is the CTO of Twiki Inc, a company providing enterprise agility platform solutions. He invented the concept of structured wikis - where free form wiki content can be structured with tailored wiki applications. Peter is the recognized thought-leader in wikis and social software, featured in numerous articles and technology conferences including LinuxWorld, Business Week, Wall Street Journal and more. He graduated from the Swiss Federal Institute of Technology in Zurich, lived in Japan for 8 years, and deployed several large-scale wikis around the globe. He co-authored the Wikis for Dummies book.

2010-20: Director's Colloquium by Dr. Jeff Cuzzi

On Tuesday, Sept. 28, at 3 p.m. in the Space Sciences auditorium (N-245), Dr. Jeff Cuzzi, will present a Director's Colloquium entitled "Two Easy Pieces: Saturn's Rings and Planetesimal Formation." Following the colloquium, there will be a reception outside the auditorium. All of staff is invited.

Abstract: The first part of the presentation will review the most exciting recent developments and big outstanding questions regarding the structure, composition, origin and evolution of Saturn's rings after six years of study by Cassini, and point out several ways in which ring particle disk physics helps us understand planetary formation in the protoplanetary nebula. The second part will be a review of the state of knowledge regarding the first, or "primary" accretion of planetesimals such as asteroids and comets, noting how the 200-year puzzle of the meteorite record contains key clues. Cuzzi will show how recent fluid dynamical models lead to a promising primary accretion scenario for not only asteroids, but also the Kuiper Belt Objects of the outer solar system.

Bibliography: Cuzzi received his Ph.D. in planetary science at the California Institute of Technology in 1973. Currently, he is a research scientist in the Space Science Division at Ames. His research interests fall into two general areas, planetary rings and the formation of planetesimals. He has been on many advisory and review groups including being associate editor of both *Icarus* and *J. Geophys. Research (Planets)*. He has won many honors and awards including most recently the very prestigious Gerald. P. Kuiper Prize for 2010.

2010-21: 2010 H. Julian Allen Award Presentation by Drs. Andrew Pohorille and Eric Darve

On Thursday, Oct. 14, at 3 p.m. in the Space Sciences auditorium (N-245), Drs. Andrew Pohorille and Eric Darve, will give the 2010 H. Julian Allen Award Presentation entitled “The Quest for Efficient Methods to Calculate Free Energies: Bridging Statistical Mechanics and Molecular Biology.” Following the colloquium, there will be a wine and cheese reception outside the auditorium. All of staff is invited.

Abstract How do proteins fold into their native three-dimensional structures, enzymes interact with candidate drugs, proteins in muscles stretch in response to the applied force or channels mediate permeation of ions and nutrients across cell walls? A common feature of these, and many other important problems in chemistry and molecular biology, is that one needs to know how the free energy of the system changes during the process. Our award winning 2001 paper published in the *Journal of Chemical Physics* provides a general solution to this problem. We derive formulas for calculating statistically averaged forces acting on the system along arbitrary coordinates that describe chemical or biological processes of interest. Then, we give a prescription how these forces can be rapidly adjusted in an adaptive manner such that, on average, there is no force acting on the system along the selected reaction coordinates. Without sacrifice of theoretical rigor, this guarantees uniform sampling of all relevant states of the system, which in turn implies optimal efficiency of free energy calculations. The method is being used by a rapidly increasing number of researchers, always yielding significant improvements in efficiency and accuracy.

Bibliographies: Andrew Pohorille received Ph.D. in theoretical physics and structural biology from University of Warsaw. He did his postdoctoral work at the Institut de Biologie Physico-Chimique in Paris under Prof. Bernard Pullman. Since 1992 he has been professor of Chemistry and Pharmaceutical Chemistry at the University of California San Francisco. In 1996 he joined the staff of NASA Ames Research Center. In 2002 he was awarded NASA Exceptional Scientific Achievement Medal. His main interests have been focused on modeling the origins of life, computer simulations of biomolecular systems, modeling genetic and metabolic networks, and statistical mechanics of condensed phases.

Eric Darve received Ph.D. in Applied Mathematics from Pierre et Marie Curie University in Paris under Prof. Olivier Pironneau. Between 1999 and 2001, he held a postdoctoral position in the Center of Turbulence Research at Stanford and at NASA Ames, working with Andrew Pohorille. Since then he has been a faculty member at the Department of Mechanical Engineering at Stanford. His research is focused on the development of numerical methods for large scale scientific computing with applications in biomolecular simulations, fluid and solid mechanics, and electromagnetics.

2010-22: Director's Colloquium by Dr. Peter McCullough

On Thursday, Dec. 9, at 3:30 p.m. in the Space Sciences Auditorium (N-245), Dr. Peter McCullough will present a Director's Colloquium entitled "Characterization of Transiting Extrasolar Planets with Spitzer and Hubble." There will be a reception following the colloquium in the lobby outside of the auditorium. All Ames employees are cordially invited to attend.

Abstract: In the past decade, one of the fastest growing fields of astronomy has been the discovery and characterization of planets that pass in front of (or "transit") their host stars. From telescopes in backyards to ones in space, observations of our "XO Project" and many others around the globe and around the solar system (including Kepler) are contributing to this burgeoning field of inquiry. I will review highlights from three recent characterization programs of mine that use the Spitzer and Hubble space telescopes. In particular, time series photometry of high precision with the Spitzer IRAC instrument have challenged the prevailing hypothesis for the formation of hot stratospheres of such planets (XO-1b, XO-2b, and XO3-b). Time series of spectrophotometry with Hubble's NICMOS instrument have provided initial tantalizing and controversial glimpses into the atomic and molecular content of transiting planets' atmospheres (HD189733b, XO-1b). Prior to the May 2009 servicing mission of HST, we used one of HST's fine guidance sensors, FGS-2r, as a photometer to observe the transiting planet host star HD17156 for ten straight days with a precision of 120 ppm per minute. We derived the mean density of the star by two independent methods, the transit technique and asteroseismology, and find they agree, thereby validating the two methods.

Biography: Dr. Peter R. McCullough received his B.S. from the University of North Carolina and graduated with a Ph.D. in astronomy from UC Berkeley in 1993. Next he was a Hubble Fellow and served on the faculty of the University of Illinois. Dr. McCullough is now a research scientist at the Space Telescope Science Institute in Baltimore where he has worked on the Hubble Space Telescope and the James Webb Space Telescope. He also leads the XO Robotic Survey that uses ground-based telescopes in Hawaii to search for Jovian (Jupiter-like) planets transiting very bright stars, the long-term goal of which is to find and study transiting giant planets orbiting nearby stars.

2010-23: Director's Colloquium by Dr. Peter McCullough

On Friday, Dec. 10, at 2 p.m. in the Space Sciences & Astrobiology Auditorium (N-245), Dr. Peter McCullough will present a second Director's Colloquium entitled "Reliable and Affordable Wireless Delivery of Fusion Power to your Home: why I have Solar Panels and you will too." There will be a reception following the colloquium in the lobby outside of the auditorium. All of staff are cordially invited.

Abstract: In this presentation, Dr. Peter McCullough describes his experiences with professionally installed solar photovoltaic panels on his home. He quantifies how they are both affordable and reliable. He projects how similar experiences across the USA and the world have the power, both electrical and motivational, to mitigate some of the risks to you, our nation, and humankind associated with the revolution from fossil fuels to renewable sources of energy.

Biography: Dr. Peter R. McCullough received his B.S. from the University of North Carolina and graduated with a Ph.D. in astronomy from UC Berkeley in 1993. Next he was a Hubble Fellow and served on the faculty of the University of Illinois. McCullough is now a research scientist at the Space Telescope Science Institute in Baltimore where he has worked on the Hubble Space Telescope and the James Webb Space Telescope. He also leads the XO Robotic Survey that uses ground-based telescopes in Hawaii to search for Jovian (Jupiter-like) planets transiting very bright stars, the long-term goal of which is to find and study transiting giant planets orbiting nearby stars.

Director's Colloquia (2011)

- 2011-1* (1/27/2011) Dr. Richard L. Garwin
A Candidate Near-Term Satellite System for Domestic Air Traffic Control
- 2011-2* (2/9/2011) Dr. Felisa Wolfe-Simon
Microbes and the four basic strategies for life on Earth
- 2011-3* (2/23/2011) William Borucki
Recent Results from the Kepler Mission Search for Other Earths
- 2011-4 (3/15/2011) Professor Drew Endy
Past Performance is No Guarantee -- The Future of Synthetic Biology
- 2011-5* (6/7/2011) Dr. Matt Small
Overview of Science at the Environmental Protection Agency (EPA) and a Presentation of Ground Water Cleanup Research
- 2011-6* (6/14/2011) Dr. Kevin Zahnle
Dune: The Other Habitable Planet
- 2011-7 (6/21/2011) Dr. Jack Lissauer
Kepler's Multiple Planet Systems
- 2011-8 (6/28/2011) Sandy Lozito
Terminal Area Procedures in the Future Air Traffic Management System
- 2011-9* (7/5/2011) Dr. S. Pete Worden
Protecting Earth from Asteroids
- 2011-10 (7/7/2011) Professor Daniel Lidar
Quantum computation: advantages, problems and solutions. Or, why would I want to own a quantum computer?
- 2011-11* (7/12/2011) Professor Jay Keasling
Synthetic Biology for Synthetic Chemistry
- 2011-12* (7/12/2011) Dr. Mary Kaiser
Smoothing the bumps: Human-Systems Integration Research at NASA
- 2011-13 (7/14/2011) Astronaut Steve Hawley
My Life With the Hubble Space Telescope

- 2011-14* (7/14/2011) Dr. Rabi Mehta
Aerodynamics of Sport Balls
- 2011-15 (7/14/2011) Dr. Steve Hawley
Abundances in ‘Green Pea’ Star-forming Galaxies
- 2011-16 (7/19/2011) Dr. Katherine Hoag
Using Science Research, Tools and Approaches in Air Quality Management Decision Making
- 2011-17* (7/26/2011) Dr. Lee Bebout
Microbial Systems: Nexus roles for Astrobiology, Energy and Space
- 2011-18* (8/2/2011) Dr. Natalie Batalha
Honing in on eta-Earth: Kepler’s Hunt for Habitable Planets
- 2011-19* (8/9/2011) Dr. Chris McKay
Perchlorate and organics in mid-latitudes on Mars and implications for the search for life.
- 2011-20 (9/6/2011) Dr. Mark Marley
2011 HJA Presentation: Precipitating Condensation Clouds in Substellar Atmospheres
- 2011-21* (9/20/2011) Dr. Carl Pilcher
Explorer, Nobel Laureate, Astrobiologist: Things you Never Knew About Barry Blumberg
- 2011-22* (10/18/2011) Dr. Paul Spudis
A Rationale for Cislunar Space
- 2011-23 (10/19/2011) Dr. David Des Marais
The landing Site Search for the Mars Science Laboratory Mission has led to Gale Crater
- 2011-24 (12/8/2011) Dr. Warren M. Washington
20th and 21st Century Climate Change: Climate Modeling, Societal Impacts, and Environmental Justice

*Denotes that the colloquium is available on DVD in the library

2011-1: Colloquium by Dr. Richard L. Garwin

Please join us on Thursday, Jan. 27 at 3:30 p.m. in the N201 Main Auditorium to hear one of the nations preeminent physicists, Dr. Richard L. Garwin, present “A Candidate Near-Term Satellite System for Domestic Air Traffic Control.” A reception will follow in the lobby of Building 200.

Abstract: Air traffic control is important for the safety of aviation and for its contribution to the economy. The issue of how best to provide air traffic control services was addressed over several years by the Air Traffic Control Panel of the President’s Science Advisory Committee (PSAC), led by Garwin. The resulting report, released in 1971, provided considerable detail on the solution of choice: an all-satellite system for providing the three components of air traffic control (navigation, communication, and independent monitoring of position and velocity). Despite delays in implementing the system, largely caused by reluctance to do so, it is worth comparing the proposed approach to what could and should be done now. The talk will be enlivened by some of the speaker’s experiences in fields related to civil and military aviation.

Bio: Richard L. Garwin is a famous American physicist. He received a B.S. in Physics from Case Institute of Technology, Cleveland, in 1947, and a Ph.D. in Physics from the University of Chicago in 1949. After three years on the faculty of the University of Chicago, he joined IBM Corporation in 1952, and was until June 1993 IBM Fellow at the Thomas J. Watson Research Center, Yorktown Heights, New York. He has been Director of the IBM Watson Laboratory, Director of Applied Research at the IBM Thomas J. Watson Research Center, and a member of the IBM Corporate Technical Committee. Currently he is an IBM Fellow Emeritus.

Garwin has made contributions in the design of nuclear weapons, in instruments and electronics for research in nuclear and low-temperature physics, in the establishment of the non-conservation of parity and the demonstration of some of its striking consequences, in computer elements and systems, including superconducting devices, in communication systems, in the behavior of solid helium, in the detection of gravitational radiation, and in military technology. He has published more than 500 papers and been granted 45 U.S. patents. He has testified to many Congressional committees on matters involving national security, transportation, energy policy and technology, and the like. He is coauthor of many books to numerous to enumerate here. He is a member of the National Academy of Sciences, the Institute of Medicine, the National Academy of Engineering, the Council on Foreign Relations, and the American Philosophical Society. In 2002 he was elected again to the Council of the National Academy of Sciences. In 2003 he received from the President the National Medal of Science. In summary he is one of the most brilliant and decorated scientists of our time.

2011-2: Director's Colloquium by Dr. Felisa Wolfe-Simon

On Wednesday, Feb. 9, at 2 p.m. in the Main Auditorium (N-201), Dr. Felisa Wolfe-Simon will present a Director's Colloquium entitled "Microbes and the four basic strategies for life on Earth". There will be a reception following the colloquium in the lobby of N200. All of staff are cordially invited.

Abstract: Life on Earth is metabolically diverse and yet maintains a biochemical unity. That is, all known biology is composed of essentially identical components such as DNA/RNA, proteins and lipids made of carbon, hydrogen, nitrogen, oxygen, sulfur and phosphorus; while the physiology of organisms can be highly varied. The basis for all life starts with chemical underpinnings. This chemical potential manifests in four metabolic strategies used by life on Earth today, all of which most likely evolved in the distant past. However, a single metabolism is not linked to a unique microbe. For example some microbes, like Cyanobacteria, may utilize known biological processes, like photosynthesis, in alternative ways with relatively unexplored yet potentially significant biogeochemistry. What is the importance of facultative anoxygenic photosynthesis now and in the past?

In addition to well-known microbes with unexpected metabolism, current research is also addressing this "unity of biochemistry" to identify potential alternatives to "CHNOSP"-based life. Similar to individual cambialistic metalloproteins, maybe microbes could take advantage of similarities between the light elements and their periodic table neighbors. For example, could there be some level of biochemical substitution for arsenic in place of phosphorus? Taken together, using interdisciplinary tools to probe for variations on these themes of microbial metabolic flexibility and alternative biochemistry may help us gain a deeper understanding of the life-we-do-know and suggest the possibilities to find or synthesized alternatives here on Earth.

Bio: Felisa Wolfe-Simon is currently a NASA Astrobiology Research Fellow in residence at the U.S. Geological Survey in Menlo Park, California. Her interests broadly cover the intersection between biology and geology with a focus on astrobiology and the study of life in a planetary context. As an active member of the NASA Astrobiology Institute, Dr. Wolfe-Simon's research seeks to address geologically informed hypotheses to unravel the biogeochemical co-evolution of life and Earth. She applies tools from molecular biology, biochemistry and physiology as well as engages in close collaborations with colleagues that are experts in techniques that range from mass spectrometry to X-ray spectroscopy. Specifically, her work has addressed the evolution of metal-based enzymes and their role in globally relevant processes like photosynthesis. Building on these ideas, she has developed an interest in using "what-we-do-know" about biological processes to help uncover what "we-don't-know" and promote approaches to search for and think about alternative biochemistries on Earth. She obtained her dual undergraduate degrees in Biology (B.A.) and Music Performance (B.M.) at Oberlin College and Conservatory of Music and went on to earn her Ph.D. in Oceanography at Rutgers University. She pursued postdoctoral work as an NSF Fellow in Biology at Arizona State and Harvard Universities.

2011-3: Director's Colloquium by William Borucki

On Wednesday, Feb. 23, at 2 p.m. in the Main Auditorium (N201), William Borucki will present a Director's Colloquium entitled, "Recent Results from the Kepler Mission Search for Other Earths." There will be a reception following the colloquium in the lobby of Building 200. All Ames employees are invited to attend.

Abstract: Is our Milky Way galaxy home to other planets the size of Earth? The Kepler Mission has released its latest findings from the analysis of the first four months of observations. The findings increase the number of planet candidates identified by Kepler to-date to 1,235. Of these, 68 are approximately Earth-size; 288 are super-Earth-size; 663 are Neptune-size; 165 are the size of Jupiter and 19 are larger than Jupiter. Of the 54 new planet candidates found in the habitable zone, five are near Earth-sized. The remaining 49 habitable zone candidates range from super-Earth size -- up to twice the size of Earth -- to larger than Jupiter. Among the stars with planetary candidates, 170 show evidence of multiple planetary candidates, including one, Kepler-11, that scientists have been able to confirm that it has no fewer than six planets.

Biography: William Borucki is a space scientist at the NASA's Ames. He received a master's degree in physics from the University of Wisconsin, Madison in 1962 and then moved to Silicon Valley where he first worked on the development of the heat shield for the Apollo Mission in the Hypersonic Free Flight Branch at NASA Ames. After the successful moon landings, he transferred to the Theoretical Studies Branch where he investigated lightning activity in planetary atmospheres and developed mathematical models to predict the effects of nitric oxides and chlorofluoromethanes on Earth's ozone layer.

Currently, he is the science principal investigator for the Kepler Mission that uses transit photometry to observe over 100,000 stars and is designed to determine the frequency of terrestrial planets orbiting in and near the habitable zones of other stars. Kepler launched on March 6, 2009, and is now in the science operations phase.

2011-4: Director's Colloquium by Professor Drew Endy

On Tuesday, March 15, at 3 p.m. in the Space Sciences Auditorium (N-245), Professor Drew Endy will present a Director's Colloquium entitled "Past Performance is No Guarantee -- The Future of Synthetic Biology." There will be a reception following the colloquium in the lobby outside the auditorium. All Ames employees are invited. This presentation is co-sponsored by the NASA Space Synthetic Biology Initiative, which is designed to harness biology in reliable, robust, engineered systems to support NASA's exploration and science missions.

Abstract: Professor Endy will discuss the synthetic biology research in his laboratory at Stanford, especially as it applies to enabling the engineering of genetically encoded memory systems. Modest amounts of programmable memory, if implemented within living organisms, would have profound impacts on the study and treatment of diseases and would broadly enable non-medical applications of biotechnology. Dr. Endy's laboratory is interested in the basic science of how to best store information inside cells as well as practical applications of the technology. Dr. Endy's work in the area of synthetic biology has the overall long-term goal of making biology easier to engineer.

Biography: Drew Endy is an Assistant Professor of Bioengineering at Stanford. He earned a BS and MS in Civil and Environmental Engineering, respectively, from Lehigh University and a PhD in Biochemical Engineering from Dartmouth College. Drew joined the Stanford faculty in late 2008, having previously studied with and served on the Biological Engineering faculty at MIT.

Current student-led projects in his laboratory include the design and implementation of scaleable genetically encoded information storage systems, and also genetically encoded cell-cell communication systems in which the channel and message can be decoupled so as to support the transmission of many messages via a common channel. Dr. Endy is the founding director of the public benefit BIOFAB facility in Emeryville CA, which is developing "expression operating systems" enabling organismal engineering at the genome scale, and the founding president of the public benefit BioBricks Foundation, which develops and supports legal frameworks and open technical standards that enable genetic engineering.

2011-5: Director's Colloquium by Dr. Matt Small

On Tuesday, June 7, at 2 p.m. in the Main Auditorium (N201), Dr. Matt Small will present the first colloquium in the 2011 Director's Colloquium Summer Series entitled, "Overview of Science at the Environmental Protection Agency (EPA) and a Presentation of Ground Water Cleanup Research." This is an opportunity to learn about some of the science that is being done at the EPA, especially as it applies to ground water cleanup, a topic of significant interest here at Ames Research Center. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Dr. Matt Small will discuss science at the U.S. Environmental Protection Agency (EPA) from two perspectives. First, he will present a "big picture" overview of how science is integrated into the EPA nationwide. This will include a discussion of environmental research being conducted at EPA's 13 Office of Research and Development (ORD) laboratories and how this information is translated into regulatory decisions in EPA's 10 Regional offices. Second, he will present a more personal view of research at EPA, describing one of his current research collaborations with Dr. Jim Weaver of the EPA laboratory in ADA, OK. Matt will discuss a new model for predicting fate and transport of dissolved contaminants in ground water from a source to a pumping well. This unique analytical solution includes source "weathering" as well as longitudinal dispersion, decay, and retardation along streamlines between source and well. The analytical nature of the solution allows for rapid statistical evaluation of multiple input parameter values to create a distribution of possible results with associated statistical confidence. This allows for rapid screening of possible risk-reduction scenarios even in the face of limited or incomplete data. Matt will conclude with a vision of how this model and other EPA tools could be integrated with NASA tools to provide real-time evaluation of risk-reduction scenarios using smart phone and smart pad technologies.

Biography: Matt has over twenty years of experience in both the private and public sectors, degrees in engineering and geology, with minors in public policy and environmental law. He has worked at the regional, national, and international levels to devise solutions for contaminant cleanups, well head protection, landfills, gasoline additives, risk-based cleanup goals, wastewater treatment, and high profile enforcement. Matt led the effort to create national guidance for remediation by natural attenuation and participated in creating guidance for risk-based corrective action (RBCA), resulting in EPA Office of Solid Waste and Emergency Response (OSWER) directives and American Society for Testing and Materials (ASTM) guidance documents. Matt is a Registered Geologist and received his PhD in Engineering from the University of California, Berkeley. Matt has twice been selected as the Bay Area Federal Employee of the Year in the Scientific Category. He was given an Exceptional Scientific Achievement award in 2008.

2011-6: Director's Colloquium by Dr. Kevin Zahnle

On Tuesday, June 14, at 2 p.m. in the Main Auditorium (N201), Dr. Kevin Zahnle will present the second colloquium in the 2011 Director's Colloquium Summer Series entitled, "Dune: The Other Habitable Planet." Zahnle is a leading planetary scientist, as evidenced by his recent election as a Fellow of the American Geophysical Union. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Earth is the only known factual habitable planet; Arrakis (a.k.a. "Dune") is the most completely imagined fictional habitable planet. Earth is an ocean planet with abundant rain. Dune is an extreme desert planet where liquid water and life are confined to the polar caps. Here we use a spartan general circulation model to show that desert planets can be habitable both nearer and farther from their suns than ocean planets like Earth. When far from its sun, the desert planet better resists freezing over into a global glacial waste. When close to its sun, the desert planet better resists the runaway greenhouse effect where all water evaporates and the surface heats enough to melt rock. On the desert planet, liquid water can be stable near the poles even when equatorial temperatures approach 100 C. Such a desert planet resembles the fictional planet Dune. We explore whether it is possible for a planet like Earth or Venus to evolve from an ocean planet to a desert planet without becoming uninhabitable in the transition.

Biography: Dr. Kevin Zahnle is a California native, having moved here from Michigan in 1985. He took his undergraduate degree in physics from McGill University, Montreal, Quebec in 1978, and has not yet returned it. He then took a Doctoral degree in Astronomy and Atmospheric and Oceanic Sciences from the University of Michigan under the supervision of Professors James CG Walker and Robert Kirshner. [There is no evidence that he obtained a masters degree from anyone.] He came to Ames in 1985 as an NRC postdoc for Dr. James B. Pollack and Dr. James F. Kasting, who turned his latent interest in planetary science into a career. He briefly contributed overhead to Stanford University (while developing an enduring collaboration with Prof. Norman H Sleep) before being hired as a civil servant in the Space Sciences Division by Dr. David Morrison in 1989. He is proud to still be here.

2011-7: Director's Colloquium by Dr. Jack Lissauer

On Tuesday, June 21, at 2 p.m. in the Main Auditorium (N201), Dr. Jack Lissauer will present the third colloquium in the 2011 Director's Colloquium Summer Series entitled, "Kepler's Multiple Planet Systems." This is an opportunity to learn about the exciting Kepler mission, which is looking for Earth-like planets around other stars. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Among the 1000 Kepler targets that have candidate planets, 170 have two or more candidate planets. While most of these objects have not yet been confirmed as true planets, the overall false-positive rate is likely to be low enough that statistical studies can be performed on these candidates. Such studies reveal a great deal about the architecture of planetary systems, including the typical spacing of orbits and flatness of planetary systems. The results of such statistical studies, as well as the characteristics of the three confirmed Kepler multi-planet systems, will be discussed.

Biography: Jack Lissauer is a space scientist in the Planetary Systems Branch at NASA's Ames Research Center and a Consulting Professor at Stanford University. His primary research interests are the formation of planetary systems, detection of extrasolar planets, planetary dynamics and chaos, and planetary ring systems. Lissauer is co-discoverer of the first four planets known to orbit about faint M dwarf stars, all 16 Kepler planets found to date, and also co-discovered two faint outer rings and two small inner moons of the planet Uranus. Lissauer is the co-author of the graduate level textbook *Planetary Sciences* (which received the 2007 Chambliss Writing Prize from the American Astronomical Society) and a Co-Investigator on NASA's Kepler Mission. He was awarded an Alfred P. Sloan Foundation fellowship, the 1992 Harold C. Urey Prize of the Division of Planetary Sciences of the American Astronomical Society, a 2006 SpotBeam Award from the California Space Authority, was named an Ames Associate Fellow by NASA Ames in 2007 and an AGU Fellow by the American Geophysical Union in 2011.

2011-8: Director's Colloquium by Sandy Lozito

On Tuesday, June 28, at 2 p.m. in the Main Auditorium (N201), Sandy Lozito will present the fourth colloquium in the 2011 Director's Colloquium Summer Series entitled, "Terminal Area Procedures in the Future Air Traffic Management System." This is an opportunity to learn about Ames' world-class effort in designing the next generation air traffic system. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Parallel runway operations have been found to increase capacity within the National Airspace System (NAS); however, poor visibility conditions at airports reduce this capacity. Much research has been conducted to examine the concepts and procedures related to parallel runways; however, there has been no investigation of the procedures associated with the strategic and tactical pairing of aircraft for these operations. A human-in-the-loop simulation study examined the pilot and controller procedures and information requirements for creating aircraft pairs for parallel runway operations. The goal was to achieve safe and efficient aircraft pairing for parallel runways using new tools and procedures. This presentation will describe the simulation methods and results from that investigation.

Biography: Sandy Lozito has worked as a researcher at NASA for over 20 year. Ms. Lozito has worked on several projects at NASA, including surface automation, data link communication, and flight deck automation. Her particular areas of interest include issues associated with human computer interaction and the roles and responsibilities of human operators and automation. Sandy has a Master of Art's degree in Experimental Psychology from San Jose State University.

2011-9: Director's Colloquium by Dr. S. Pete Worden

On Tuesday, July 5, at 2 p.m. in the Main Auditorium (N201), Ames Center Director Dr. S. Pete Worden will present the fifth colloquium in the 2011 Director's Colloquium Summer Series entitled, "Protecting Earth from Asteroids." There has been growing interest and attention by the public and the scientific community in identifying potentially hazardous asteroids and considering mitigation strategies. Congress has assigned NASA these tasks. In this presentation, Worden will review the current status of these studies and programs, as well as introduce some future possibilities and issues. This presentation will be followed by a reception in the lobby of Building 200. All Ames employees, and especially Ames' summer students, are cordially invited to attend. This is an opportunity to learn about what can be done to protect the planet from asteroid impacts.

Biography: Dr. Simon P. Worden (Brig. Gen., USAF, ret.) is the director of NASA Ames Research Center. Prior positions for Worden include: research professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona; director of Development and Transformation, Space and Missile Systems Center, Air Force Space Command; Consultant to the Defense Advanced Research Projects Agency (DARPA) on space-related issues; Congressional Fellow with the Office of Senator Sam Brownback as advisor on NASA and space issues; staff officer for the President's National Space Council. Worden spearheaded efforts to revitalize U.S. civil space exploration and Earth-monitoring systems. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences and strategic studies, served as a scientific co-investigator for two NASA space science missions, and is a recognized expert on space issues – both civil and military. Worden retired in 2004 after 29 years of active service in the United States Air Force.

2011-10: Director's Colloquium by Professor Daniel Lidar

On Thursday, July 7, at 2 p.m. in the Space Sciences Auditorium (N245), Professor Daniel Lidar will present a director's colloquium entitled, "Quantum computation: advantages, problems and solutions. Or, why would I want to own a quantum computer?" This is an opportunity to learn something about the emerging field of quantum computation. His presentation will be followed by a wine and cheese reception outside the auditorium on the second floor of the Space Sciences building (N245). All Ames employees and our Ames summer students are cordially invited.

Abstract: Quantum computation has the potential to become a major game changing technology with applications in cryptography, data processing, and machine learning, to name a few. In some cases quantum algorithms exist which are provably superior to their classical counterparts, and in many other cases quantum algorithms are strongly suspected to offer exponential speedups, while formal proofs are not yet available. In all cases this promise awaits a hardware realization, and is compromised by the problem of decoherence, or noise. This talk will survey some of the breakthroughs in quantum algorithms, with an emphasis on the adiabatic model of quantum computation and methods for overcoming the problem of decoherence. Potential applications of interest to NASA will be highlighted.

Biography: Daniel Lidar is a professor of electrical engineering and chemistry at the University of Southern California, and holds a cross-appointment in physics. He obtained his Ph.D. in physics from the Hebrew University of Jerusalem in 1997. He was a postdoc at UC Berkeley from 1997 to 2000, then on the Chemistry department faculty at the University of Toronto from 2000 to 2005, with cross-appointments in mathematics and physics. His research interests lie primarily in the theory and control of open quantum systems, with a special emphasis on quantum information processing. His past interests include scattering theory and disordered systems.

2011-11: Director's Colloquium by Professor Jay Keasling

On Tuesday, July 12, at 11 a.m. in the Main Auditorium (N201), Professor Jay Keasling will present a director's colloquium entitled, "Synthetic Biology for Synthetic Chemistry." This is an opportunity to learn something about the emerging field of synthetic biology, which has the potential to revolutionize NASA's mission. All Ames employees and the Ames summer students are cordially invited.

Abstract: Synthetic biology is the design and construction of new biological entities such as enzymes, genetic circuits, and cells or the redesign of existing biological systems. Synthetic biology builds on the advances in molecular, cell, and systems biology and seeks to transform biology in the same way that synthesis transformed chemistry and integrated circuit design transformed computing. The element that distinguishes synthetic biology from traditional molecular and cellular biology is the focus on the design and construction of core components (parts of enzymes, genetic circuits, metabolic pathways, etc.) that can be modeled, understood, and tuned to meet specific performance criteria, and the assembly of these smaller parts and devices into larger integrated systems that solve specific problems. Keasling will discuss some of the work in his laboratory, such as the use of synthetic biology to create an inexpensive, effective, anti-malarial drug and the use of microorganisms to produce advanced biofuels.

Biography: Jay Keasling received his MS and Ph.D. degrees in chemical engineering from the University of Michigan. He joined the Department of Chemical Engineering at the University of California, Berkeley as an assistant professor in 1992, where he is currently the Hubbard Howe Distinguished Professor of Biochemical Engineering. Keasling is also a professor in the Department of Bioengineering at Berkeley, a senior faculty scientist and acting deputy director of the Lawrence Berkeley National Laboratory and Chief Executive Officer of the Joint BioEnergy Institute. He is considered one of the foremost authorities in synthetic biology, especially in the field of metabolic engineering and his research focuses on engineering microorganisms for environmentally friendly synthesis of small molecules or degradation of environmental contaminants.

2011-12: Director's Colloquium by Dr. Mary Kaiser

On Tuesday, July 12, at 2 p.m. in the Main Auditorium (N201), Dr. Mary Kaiser will present the sixth colloquium in the 2011 Director's Colloquium Summer Series entitled, "Smoothing the bumps: Human-Systems Integration Research at NASA." This is an opportunity to learn about Ames' world-class effort in human systems integration. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Dr. Mary Kaiser will give a short introduction to the field of Human Systems Integration and the work in this domain here at NASA Ames. She will then describe how a team from the Human Systems Integration Division addressed a specific design issue for NASA's Constellation Program, namely how the vibration resulting from the Ares I thrust oscillation would impact crew performance.

Biography: Mary K. Kaiser is a research psychologist in the Human Systems Integration Division at NASA Ames Research Center. She received her Ph.D. in psychology from the University of Virginia, and was a postdoctoral fellow at the University of Michigan in applied experimental psychology before joining Ames in 1985. The author of over sixty articles and chapters on perceptual psychology and human factors and a Fellow of the Association for Psychological Science, Dr. Kaiser also served as an associate editor of the *Journal of Experimental Psychology: Human Perception and Performance* for over a decade, and is currently Project Scientist for NASA's Space Human Factors Engineering Project.

2011-13: Director's Colloquium by former Astronaut Steve Hawley

On Thursday, July 14, at 11 a.m. in the Main Auditorium (N201), former astronaut Steve Hawley will present a director's colloquium entitled, "My Life With the Hubble Space Telescope." This is an opportunity to get the behind-the-scenes story about preparing for and working on the Hubble Space Telescope and to see some of the more famous images the telescope has taken. All Ames employees and the Ames summer students are cordially invited.

Abstract: The Hubble Space Telescope (HST) is arguably the single most visible thing that NASA has done since the lunar landings. The drama of astronauts working to repair or upgrade HST captured the interest of the general public, and the spectacular scientific results from HST have revolutionized our understanding of the universe in ways that were even beyond the dreams of Hubble team when HST was launched in 1990. Hawley will discuss the original concepts behind the maintenance and operations of the Hubble Space Telescope, as well as the challenges and achievements that were key to keeping HST a state-of-art-observatory for 21 years in orbit. He will share some behind-the-scenes stories about preparing for and working on HST in orbit, and will share pictures that were taken on the missions as well as some of the more famous scientific images that Hubble has taken.

Biography: Steve Hawley received a doctor of philosophy in astronomy and astrophysics from the University of California, Santa Cruz in 1977. Hawley was selected as a NASA astronaut in January 1978. He is a veteran of five space flights (STS-41D in 1984, STS-61C in 1986, STS-31 in 1990, STS-82 in 1997 and STS-93 in 1999). Three of his missions involved NASA's Great Observatories. Hawley has logged more than 32 days in space. He retired from NASA and returned to the University of Kansas in 2008 where he is a professor of physics and astronomy and director of the Engineering Physics program. Hawley's research interests include spectrophotometry of nebulae and active or star-forming galaxies as well as the problems of human spaceflight. Hawley is a member of the American Astronomical Society, the Astronomical Society of the Pacific, the American Institute of Aeronautics and Astronautics, and the Association of Space Explorers.

2011-14: Director's Colloquium by Dr. Rabi Mehta

On Thursday, July 14, at 2 p.m. in the Main auditorium (N-201), Dr. Rabi Mehta of the Experimental Aero-Physics Branch will present a director's colloquium entitled "Aerodynamics of Sport Balls." If you ever wondered how to make a baseball curve or why a golf ball has dimples, this colloquium is for you. All of staff, and especially our students, are cordially invited to attend. There will be a reception following in the lobby of Building 200.

Abstract: Aerodynamics plays a prominent role in defining the flight of a ball that is struck or thrown through the air in almost all ball sports. The main interest is in the fact that the ball can often deviate from its initial straight path, resulting in a curved, or sometimes an unpredictable, flight path. It is particularly fascinating that not all the parameters that affect the flight of a ball are always under human influence. Lateral deflection in flight, commonly known as swing, swerve or curve, is well recognized in cricket, tennis, golf, soccer, volleyball and baseball. The aerodynamics of several different sports balls, including cricket balls, tennis balls, golf balls, soccer balls, volleyballs and baseballs will be discussed with the help of video clips, test measurements and theoretical analyses.

Bio: Rabi Mehta received his Ph.D. in Aeronautics from Imperial College London in 1978. He is currently chief of the Experimental Aero-Physics Branch at NASA Ames, which specializes in experimental research and testing in aerodynamics and fluid mechanics using advanced instrumentation techniques, a lot of them developed in house. In recent years, the branch has made significant contributions to the Space Shuttle, Constellation, Mars Science Lab and the Fundamental Aeronautics Programs.

Rabi's interest in sports ball aerodynamics was initially developed in England where he conducted a detailed experimental study of cricket ball "swing" using wind tunnels. Upon moving to the US, he extended his interests to include golf ball and baseballs, and more recently, tennis balls, volleyballs and soccer balls. This resulted in a landmark article entitled: "Aerodynamics of Sports Balls" which was published in the Annual Reviews of Fluid Mechanics in 1985. Since then, Rabi has published several articles on this topic and he is regularly consulted by sports organizations and quoted by all forms of the media.

2011-15: Second Director's Colloquium by Dr. Steve Hawley

On Thursday, July 14, at 3:30 p.m. in the Space Sciences Auditorium (N245), former astronaut Steve Hawley will present a second colloquium entitled, "Abundances in 'Green Pea' Star-forming Galaxies." Unlike his morning colloquium in N201 on his experiences with the Hubble Space Telescope, this will be a more technical talk about his research at the University of Kansas on star-forming galaxies and extragalactic H II regions. There will be a wine and cheese reception following in the lobby outside the N245 auditorium. All Ames employees and our Ames summer students are cordially invited.

Abstract: "Green Peas" is the name given to a small group of galaxies identified in 2009 from the Sloan Digital Sky Survey as part of the Galaxy Zoo project. Originally, the "Peas" were proposed to be a small and unique class of low-mass galaxies undergoing intense episodes of star formation. However, a very recent study concludes that the original "Peas" are really part of a much larger family of star-forming galaxies. Of more interest is that three separate groups have studied O/H and N/O using different abundance analysis techniques and arrived at different conclusions regarding metallicity of the "Peas". In this talk, he will present the results of an analysis of abundances for O, N, Ne, S, and He based on independently measured emission-line intensities from SDSS spectra. He will also discuss the validity of specific strong-line methods, which are frequently used to estimate metallicity in star-forming galaxies and extragalactic H II regions, as applied to the "Peas".

Biography: Steve Hawley received a doctor of philosophy in astronomy and astrophysics from the University of California, Santa Cruz in 1977. Dr. Hawley was selected as a NASA astronaut in January 1978. He is a veteran of five space flights (STS-41D in 1984, STS-61C in 1986, STS-31 in 1990, STS-82 in 1997 and STS-93 in 1999). Three of his missions involved NASA's Great Observatories. Dr. Hawley has logged more than 32 days in space. He retired from NASA and returned to the University of Kansas in 2008 where he is a professor of physics and astronomy and Director of the Engineering Physics program. Dr. Hawley's research interests include spectrophotometry of nebulae and active or star-forming galaxies as well as the problems of human spaceflight. Dr. Hawley is a member of the American Astronomical Society, the Astronomical Society of the Pacific, the American Institute of Aeronautics and Astronautics, and the Association of Space Explorers.

2011-16: Director's Colloquium by Dr. Katherine Hoag

On Tuesday, July 19, at 2 p.m. in the Main Auditorium (N201), Dr. Katherine Hoag will present the seventh colloquium in the 2011 Director's Colloquium Summer Series entitled, "Using Science Research, Tools and Approaches in Air Quality Management Decision Making." This is our second speaker from the Environmental Protection Agency (EPA), and an opportunity to learn what the EPA is doing in the Bay Area regarding air quality. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract The Clean Air Act (CAA) is powerful tool used by federal, state and local agencies to improve air quality and public health. There are many steps to implementing the CAA including setting health-based ambient air quality standards, monitoring ambient concentrations, designating attainment and nonattainment areas, understanding emissions, designing strategies to reduce emissions, and implementing these strategies via, rules, permits and enforcement. Each of these steps involves weighing the scientific information available and deciding how to proceed. It is the role of scientists at EPA to ensure that there is a sound scientific foundation to enable the Agency to make decisions that improve air quality and protect public health. This talk will cover examples throughout various sectors of clean air act implementation where scientific knowledge plays a key role in the outcome of the decisions affecting the air quality where you live.

Bio Kate Hoag currently works as part of a five-member monitoring team in the Air Quality Analysis Office at Region 9, EPA as the lead contact for the San Joaquin Valley (SJV) and Sacramento Valley air basins as well as PM_{2.5} issues throughout the region. The team's objective is to provide oversight of state and local monitoring networks, and technical and data analysis support to stakeholders outside of EPA and to air management decision-makers within EPA. Prior to her current position at EPA, Kate worked in the Air Permits Office where she lead a team of reviewers to provide EPA oversight on the initial operating permits for the large refineries in the Los Angeles area. Kate received a M.S. in Atmospheric Science from Colorado State University where she studied fog and aerosol chemistry in the SJV, and a Ph.D. in Earth and Planetary Science from UC Berkeley where she performed measurements of the stable isotopes of stratospheric CO₂ in an effort to provide tools to better understand global gross carbon fluxes. She has also worked as a laboratory scientist at the School of Public Health at UNC-Chapel Hill on determining the effectiveness of various biomarkers to quantify personal exposure to benzene and styrene.

2011-17: Director's Colloquium by Dr. Lee Bebout

On Tuesday, July 26, at 2 p.m. in the Main Auditorium (N201), Dr. Lee Bebout will present the eighth colloquium in the 2011 Director's Colloquium Summer Series entitled, "Microbial Systems: Nexus roles for Astrobiology, Energy and Space." This is an opportunity to learn about some of the work we do on microbial ecosystems at the Center. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Life on Earth is dominated by microbes, in terms of biomass, overall rates of activity, use of potentially available habitats, and length of time on the planet. Microbial ecosystems are the loci where the myriad processes necessary for regenerative cycling of energy and elements on the Earth occur. Only through their activity can this planet support higher life (including our own). These systems themselves exhibit a dazzling array of diversity in composition and metabolic capability. Increasingly this diversity is being explored and applied to address current day challenges in sustainability of renewable energy sources. These capabilities also make microbial ecosystem management a logical component of future space exploration technologies. Her presentation will take a broad view of microbes' current and potential roles in Astrobiology, Renewable Energy, and Space Exploration, touching also on some of the specific projects ongoing in our labs at Ames. The overall goal is to introduce and invite the audience on a dialogue wherein we identify the profound connections between the fields of Earth Ecology, Energy and Space Exploration, through the nexus of microbes.

Biography: Lee received her Bachelor's degree in Biology from Rhodes College in 1981, a Master's degree in geology from UNC Chapel Hill in 1985, and her Ph.D. in microbial ecology from the University of Aarhus, Denmark in 1998. She has conducted research at the University of North Carolina Institute of Marine Sciences, the Max Planck Institute for Marine Microbiology, and the Horn Point environmental lab, before coming to Ames in 1998. Here she has been instrumental in establishing the Exobiology greenhouse research facilities. Her current research activities include participation in the new Astrobiology Science and Technology for Exploring Planets (ASTEP) Lake Lander project, research on hydrogen cycling in natural and cultivated artificial microbial ecosystems, and collaborations optimizing engineering design for algal/microbial green energy production for Earth and Space.

2011-18: Director's Colloquium by Dr. Natalie Batalha

On Tuesday, Aug. 2, at 1 p.m. in the Main Auditorium (N201), Dr. Natalie Batalha will present the ninth colloquium in the 2011 Director's Colloquium Summer Series entitled, "Honing in on eta-Earth: Kepler's Hunt for Habitable Planets." This is an opportunity to get a current update on one of the coolest missions that NASA has ever launched. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Humankind's speculation about the existence of other worlds like our own turned into a veritable quest with the launch of NASA's Kepler spacecraft in March 2009. The mission is designed to survey a slice of the Milky Way Galaxy to identify planets orbiting other stars. It looks for the telltale dimming of light that occurs when an orbiting planet passes in front of the star thereby casting a shadow into space. The roster of exoplanets discovered by Kepler has reached 18 in number, including one world that is unquestionably rocky in composition. Moreover, the team has released a catalog of nearly one thousand stars showing the recurring dimmings of light that suggest the presence of a planet. The methods used to identify planets will be described in this talk as well as the discoveries that have been announced to date. Now in its third year of operation, Kepler is honing in on the answer to the question that drives the mission: are potentially habitable worlds abundant in our galaxy.

Biography: Dr. Natalie Batalha is a professor of physics and astronomy at San Jose State University in the heart of Silicon Valley, California and co-investigator on NASA's Kepler Mission. She holds a bachelor's in physics from the University of California (UC), Berkeley, and a doctorate in astrophysics from UC Santa Cruz. Dr. Batalha started her career as a stellar spectroscopist studying young, sun-like stars. After a post-doctoral fellowship in Rio de Janeiro, Brazil, Dr. Batalha returned to California.

Inspired by the growing number of exoplanet discoveries, she joined the team led by William Borucki at NASA's Ames Research Center working on transit photometry -- an emerging technology for finding exoplanets. Twelve years later, she stands poised with the Kepler team to make discoveries that humans, up to now, have left to the imagination and the realms of science fiction.

2011-19: Director's Colloquium by Dr. Chris McKay

On Tuesday, Aug. 9, at 2 p.m. in the Main Auditorium (N201), Dr. Chris McKay will present the last colloquium in the 2011 Director's Colloquium Summer Series entitled, "Perchlorate and organics in mid-latitudes on Mars and implications for the search for life." Chris is an outstanding speaker and a world class expert on Mars. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: The Phoenix discovery that chlorine on Mars is in the form of perchlorate completely changes the interpretation of the Viking Gas Chromatograph Mass Spectrometer (GCMS) search for organics. Reanalysis of the Viking results suggests the presence of perchlorate and organics at the parts per million (ppm) level at mid-latitudes on Mars. This has important implications for the upcoming Mars Science Lab (MSL)

Biography: Dr. Christopher P. McKay is a planetary scientist with the Space Science Division of NASA Ames. McKay received his Ph.D. in astrophysics from the University of Colorado in 1982, and has been a research scientist with the NASA Ames Research Center since that time. His current research focuses on the evolution of the solar system and the origin of life. He is also actively involved in planning for future Mars missions including human settlements. McKay has been involved with polar research since 1980, traveling to the Antarctic dry valleys and more recently to the Siberian and Canadian Arctic to conduct research in these Mars-like environments. Dr. McKay is a recipient of the Urey Award from the Division of Planetary Sciences of the American Astronomical Society for his contributions.

2011-20: 2011 H. Julian Allen Award Presentation by Dr. Mark Marley

Drs. Andrew S. Ackerman and Mark S. Marley were awarded the 2011 H. Julian Allen Prize for their paper entitled “Precipitating Condensation Clouds in Substellar Atmospheres”, published in *The Astrophysical Journal*, 556, pp. 872-884, (2001). On Tuesday, Sept. 6, at 3 p.m. in the Space Sciences auditorium (N-245), Dr. Mark Marley, will give the 2011 H. Julian Allen Award Presentation for this award winning paper. Following the colloquium, there will be a wine and cheese reception outside the auditorium. All of staff is invited.

Abstract: The quest for understanding both extrasolar giant planets and brown dwarfs hinges on understanding their atmospheres. Atmospheric physical, chemical, and dynamical processes regulate the release of internal heat, sculpting their emitted spectra, and, for irradiated planets, control the absorption of incident light. One of the most difficult to model--yet most important--atmospheric traits is clouds. The presence or absence of a cloud layer can dramatically alter both the absorption and emission of light and impact the evolution of a world. While it had long been understood that clouds would be an important component of any exoplanet or brown dwarf atmosphere model, before 2001 there had only been highly idealized methods for treating clouds. In particular, the alien sand, aluminum oxide, and--perhaps strangest of all--liquid iron drops that comprise these extreme cloud layers proved a challenge. In his talk Dr. Marley will discuss the importance of understanding cloud processes and explain the approach terrestrial cloud theorist and former ARC scientist Andrew Ackerman and he developed to tackle this problem and the insights that followed. He will illustrate his presentation with the various astronomical situations where clouds play a starring role, from the hot transiting giant planets, to directly imaged young planets, to brown dwarfs, to super Earths.

Mark Marley received his PhD from the University of Arizona's Lunar and Planetary Laboratory in 1990. After a postdoc at Ames with the late Jim Pollack he took a faculty position in the astronomy department at New Mexico State University where he ultimately obtained the rank of Associate Professor. In 2000 he left NMSU to return to Ames to join the Space Sciences Division in the SST branch. His research focuses on the atmospheres of solar system giant planets, extrasolar planets, and brown dwarfs. He has published almost 100 refereed scientific papers. In 2006 he was awarded the NASA medal for exceptional scientific achievement.

Andrew Ackerman finished his PhD in Atmospheric Sciences from the University of Washington in 1994, followed by a postdoc at Ames with Brian Toon. He joined the SGP branch of the Ames Earth Sciences Division in 1999 and the Goddard Institute for Space Studies in 2005. His research primarily concerns cloud physics in Earth's atmosphere and the associated effects of aerosols on climate. He has published multiple first author papers in *Nature* and *Science* that have been widely cited.

2011-21: Director's Colloquium by Dr. Carl Pilcher

On Tuesday, Sept. 20, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Carl Pilcher will present a Director's Colloquium entitled "Explorer, Nobel Laureate, Astrobiologist: Things you Never Knew About Barry Blumberg." There will be a reception following the colloquium in the lobby of building 200. Everyone at the center is invited to hear the inspiring story of one of the most influential men of our time.

Abstract: Baruch Samuel "Barry" Blumberg traveled to Earth's far reaches as a medical explorer and pioneer. Through perseverance in the face of skepticism, he made discoveries that saved hundreds of millions of lives. This remarkable career shaped his perspectives when, at age 72, he became the Founding Director of NASA's Astrobiology Institute. In this talk I will trace Barry's early years and describe how his studies of genetic variations in diverse and remote populations led to his serendipitous discovery of the Hepatitis B virus and subsequent development of a protective vaccine, for which he was awarded the 1976 Nobel Prize in Physiology or Medicine. I'll relate these experiences to his views and actions as NAI Director.

Bio: Dr. Carl B. Pilcher was appointed director of the NASA Astrobiology Institute (NAI) in September 2006. Prior to becoming NAI Director, Dr. Pilcher was the Senior Scientist for Astrobiology at NASA Headquarters. Dr. Pilcher's scientific career, mostly conducted while a member of the astronomy faculty at the University of Hawaii, includes the discoveries of water frost in Saturn's rings and on three of Jupiter's Galilean satellites and of "weather" on Neptune. Dr. Pilcher received his B.S. degree in chemistry from the Polytechnic Institute of Brooklyn and his Ph.D. in chemistry and planetary science from MIT. He also holds a Master of Public Affairs degree in international relations from Princeton University.

2011-22: Director's Colloquium by Dr. Paul Spudis

On Tuesday, Oct. 18, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Paul Spudis will present a Director's Colloquium entitled "A Rationale for Cislunar Space". There will be a reception following the colloquium in the lobby of building 200. All of staff and our resident students are cordially invited.

Abstract: The International Space Station proves that human- and machine-assembled satellites can be as big and as capable as needed, unlimited by launch vehicle size. But we cannot routinely access orbits beyond LEO with people and machines to build and maintain such satellites today. A system based around the manufacture and use of propellant made from lunar materials can reduce the cost for new space activities, enable routine access to and from the surface of the Moon, access all other points in cislunar space, including GEO and other orbits useful for space assets; and enable human interplanetary flight (i.e., to Mars and beyond). Both robotic and human presence is required on the Moon to enable and maintain production from lunar resources. By going to the Moon to establish a permanent presence, we create a reusable, extensible and maintainable (thus, affordable) transportation system, a "transcontinental railroad" for cislunar space while expanding human reach beyond LEO.

Bio: Paul D. Spudis is a Senior Staff Scientist at the Lunar and Planetary Institute in Houston, Texas. He is a geologist specializing in study of the histories of and processes on the rocky planets of the Solar System. His current research emphasis is on the deposits and environment of the poles of the Moon with the aim of understanding their potential as sites for future human exploration and use. He was educated at Arizona State University (B.S. 1976; Ph.D. 1982) and Brown University (Sc.M. 1977). He has been awarded the NASA Distinguished Service Medal, the Theodore von Karman medal from the American Institute of Aeronautics and Astronautics, and the Space Pioneer award of the National Space Society. He is the author of more than 100 scientific papers, five books, and numerous articles for the popular press.

2011-23: Director's Colloquium by Dr. David Des Marais

On Wednesday, Oct. 19, at 3 p.m. in the Space Sciences Auditorium (N245), Dr. David Des Marais will present a Director's Colloquium entitled "The landing Site Search for the Mars Science Laboratory Mission has led to Gale Crater." There will be a wine and cheese reception following the colloquium in the lobby outside the auditorium. All of staff and our resident students are cordially invited to attend.

Abstract: The Mars Science Laboratory (MSL) rover will investigate a landing site to determine whether it ever hosted an environment capable of supporting microbial life. All four of the final candidates were safe for landing and trafficability and were also scientifically compelling. Gale crater prevailed because it hosts an accessible 5 km thick mound of layered sediments that contain diverse hydrous minerals, such as sulfates and phyllosilicates. This rock sequence was deposited over an extended time period in diverse potentially habitable aqueous environments.

Biography: Dr. David Des Marais is a senior space scientist at NASA Ames Research Center. He has investigated the geochemistry of lunar samples, meteorites and both volcanic and ancient sedimentary rocks from Earth. He coordinated a long-term study of benthic cyanobacterial ecosystems. David is Principal Investigator of the Ames Research Center Team of the NASA Astrobiology Institute. He is currently a member of the science teams of NASA's 2003 Mars Exploration Rover mission, the 2005 Mars Reconnaissance Orbiter mission, the 2011 Mars Science Laboratory mission and the 2016 ExoMars/Trace Gas Orbiter mission. He has published more than 160 technical articles and chapters on these topics. David is Chair of NASA's Mars Exploration Program Analysis Group. He is a Fellow of the Geochemical Society, the European Association of Geochemistry, the International Society for the Study of the Origins of Life, the California Academy of Sciences, the American Geophysical Union, and the American Academy of Microbiology.

2011-24: Director's Colloquium by Dr. Warren M. Washington

On Thursday, Dec. 8, at 2 p.m. in the N258 auditorium, Dr. Warren M. Washington will present a Director's Colloquium entitled "20th and 21st Century Climate Change: Climate Modeling, Societal Impacts, and Environmental Justice." All Ames employees are cordially invited. Seating is limited in the N258 auditorium, so plan on arriving early to ensure a seat.

Abstract: Everyone knows that recent climate has changed almost everyone. The most recent Intergovernmental Panel on Climate Change Assessment Report (IPCC AR4) has convinced most climate scientists that humankind is changing the earth's climate and that significant global warming is taking place. Some scientists are skeptical of the IPCC view and think the observed changes result from natural climate variability or other causes. A brief review of recently observed 20th century climate change will be presented and compared with climate model simulations. These computer simulations are extended into the 21st century and beyond in preparation for the next IPCC assessment. A brief description of what is in climate models will be given with an emphasis on the physical and computational aspects. Computer simulations and animations of climate and future climate change will be shown from low and high carbon emission scenarios. Finally, at the end there will be a discussion of the scientific uncertainties and societal impacts along with an analysis of policy options including possible geoengineering of the climate system. The issue of environmental justice will also be discussed.

Bio: Warren M. Washington is a senior scientist and former head of the Climate Change Research Section in the Climate and Global Dynamics Division at the National Center for Atmospheric Research (NCAR). He has published more than 150 papers in professional journals and co-authored a book entitled, ³An Introduction to Three-Dimensional Climate Modeling.² He has served on the National Science Board (chair, 2002-2006), the NOAA Science Advisory Board, President's National Advisory Committee on Oceans and Atmosphere, several panels of the National Research Council, the Secretary of Energy's Advisory Board, among others. He is a Fellow of the American Meteorological Society (AMS), a fellow of the American Association for the Advancement of Science (AAAS), and he has also served as President of AMS and a member of the AAAS Board of Directors. He is a member of the National Academy of Engineering, American Philosophical Society, and the American Academy of Arts and Sciences. He has received many awards, including the Le Verrier Medal of the Societe Meteorologique de France, the National Weather Service Modernization Award, and the AMS Dr. Charles Anderson Award. He has honorary degrees from the Oregon State University and Bates College. He currently studies the impacts of 21st century climate change through the use of climate models. He has served as a Presidential appointee and as an advisor to Presidents Carter, Reagan, Bush, Clinton, and Bush, Jr. Finally, he has served on a climate change panel with President Obama. On November 17, 2010 he was awarded the National Medal of Science by President Obama, which is the nation's highest science award.

Director's Colloquia (2012)

- 2012-1* (2/8/2012) Astronaut Richard Linnehan
Future NASA biomedical applications and countermeasures for long duration human spaceflight and exploration
- 2012-2* (2/23/2012) Dr. Joan Vernikos
Sitting Kills, Moving Heals - Secrets from Space for Long and Healthy Living on Earth
- 2012-3 (3/8/2012) Dr. Jack Burns
The Dark Ages Radio Explorer (DARE)
- 2012-4 (4/18/2012) Dr. Colonel M.V. "Coyote" Smith
Shift Happens: Security in The Age of Surprise
- 2012-5* (5/31/2012) Dr. Charles (Charlie) Pellerin
The Fifth-Force
- 2012-6 (6/12/2012) Dr. David Morrison
Danger from the Sky: Real and Imagined
- 2012-7 (6/19/2012) Karen Bradford
Being NASA – Where do you fit on the meatball?
- 2012-8 (6/26/2012) Dr. William Warmbrodt
Rotorcraft Research at NASA Ames Research Center
- 2012-9 (7/3/2012) Dr. Chris McKay
Antarctica: Cold and Dry Like Mars - But a Lot Closer
- 2012-10 (7/10/2012) Dr. Natalie Batalha
The Road to ExoEarth: Latest Results from NASA's Kepler Mission
- 2012-11 (7/12/2012) Dr. S. Pete Worden
The Search for Life in the Universe and Our Future
- 2012-12 (7/16/2012) Dr. Adam Arkin
Synthetic biology and engineering approach to designing complex function in cells
- 2012-13 (7/17/2012) Dr. Pamela Marcum
A Year of SOFIA Science

- 2012-14 (7/24/2012) Dr. David Blake
Development and deployment of the CheMin Mineralogy Instrument on the Mars Science Laboratory
- 2012-15 (7/26/2012) Paul Saffo
Cyberspace, social media and the great turbulence: implications for global institutions
- 2012-16 (7/31/2012) Dr. Lynn Rothschild
From Astrobiology to Star Trek: Synthetic biology and NASA's Missions
- 2012-17 (8/7/2012) Dr. Chris Potter
Chapters from the "User's Manual for Research on Climate Change Impacts"
- 2012-18 (9/20/2012) Dr. Jing Li
2012 H. Julian Allen Presentation: Carbon Nanotube Sensors for Gas and Organic Vapor Detection
- 2012-19 (12/11/2012) Ravi Prakash and Bobak Ferdowsi
Curiosity: The Boldest Mission to Mars Ever

*Denotes that the colloquium is available on DVD in the library

2012-1: Director's Colloquium by Astronaut Richard Linnehan

On Wednesday, Feb. 8, at 2 p.m. in the Syvertson Auditorium (N201), Astronaut Richard Linnehan will present a Director's Colloquium entitled "Future NASA biomedical applications and countermeasures for long duration human spaceflight and exploration." Following the colloquium, there will be a reception in the lobby of N200. Everyone is cordially invited.

Abstract: Astronaut Richard Linnehan will discuss operational research in aerospace and biomedical performance-enhancing countermeasures associated with human spaceflight and exploration as well as non-exploration-related space biological research. He also will discuss novel ways to leverage ARC research and expertise in developing novel K-12 STEM curricula focusing on the importance of space-related biological technologies in U.S. education, industry and NASA's strategic vision for the future.

Bio: Astronaut Rick Linnehan, B.S., D.V.M., MPA, is currently assigned to a NASA Interagency Personnel Agreement (IPA) fostering broad research partnerships with academia and private sector organizations with the goal of reinvigorating space-related biological research critical to NASA and ARC's current and future missions. A veteran of four Space Shuttle missions, and a veterinarian trained in comparative pathophysiology, Dr. Linnehan has flown aboard Columbia on two Space Lab life sciences missions and to the Hubble Space Telescope. His last mission, flown aboard Endeavour, delivered the first element of the Japanese KIBO assembly the JEM and the Canadian robot "DEXTRE" and was one of the last EVA-intensive ISS construction missions.

2012-2: Director's Colloquium by Dr. Joan Vernikos

On Thursday, Feb. 23, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Joan Vernikos will present a Director's Colloquium entitled "Sitting Kills, Moving Heals - Secrets from Space for Long and Healthy Living on Earth." Following the colloquium, there will be a reception in the lobby of N200. Dr. Vernikos is a motivational speaker that has an important message for all of us. Everyone is cordially invited.

Abstract: The way we live is slowly killing us, and yet we can't seem to stop it. We have struggled for decades to exercise more and eat less, but we're fatter, sicker and more tired than ever before. Amazingly the answers to this conundrum came from a most unlikely source -- space. Years of research in NASA, much of it here at Ames, led to the discovery that our modern sedentary lifestyle produces a wide variety of spaceflight-like changes. It revealed the unsuspected medical connection between the health dangers of living without gravity in space, and the chronic diseases caused by sedentary lifestyles here on Earth. Dr. Vernikos presents her discovery in detail, in her new book *Sitting Kills, Moving Heals* and will share with us some of her easy-to-follow methods of incorporating "G-Effective Activity" into everyday life to improve health, increase fitness, and even delay the effects of aging.

Bio: Joan Vernikos, former Director of NASA's Life Sciences, is author, consultant and sought-after motivational speaker on the tangible health and economic benefits of healthy living and aging. Her pioneering research at Ames, established the Center's leadership as the premier Human ground Research Facility for NASA. Intimately involved with justifying John Glenn's return to space, it is this research that revealed the benefits of gravity in human health and aging on Earth that forms the basis of her thinking. A pharmacologist from the University of London, her research, and publications on the management of stress, and how spaceflight and earth's gravity affect men and women have been recognized with numerous awards. She holds three patents including one for the Human Powered Centrifuge. A member of the International Academy of Astronautics, she served on the Space Studies Board of the National Academy of Sciences, is space correspondent for Defense & Foreign Affairs. Her books include *Inactivity* (1986) with Hal Sandler, award-winning *The G-Connection: Harness Gravity and Reverse Aging*, (2004), *Stress Fitness for Seniors* (2009) and her latest book, *Sitting Kills, Moving Heals: How Simple Everyday Movement Will Prevent Pain, Illness, and Early Death and Exercise Alone Won't* (2011).

2012-3: Director's Colloquium by Dr. Jack Burns

On Thursday, March 8th, at 3 p.m. in the Space Sciences Auditorium (N245), Dr. Jack Burns will present a Director's colloquium entitled "The Dark Ages Radio Explorer (DARE)." This talk will be followed by a wine and cheese reception in the lobby outside the auditorium. In addition, starting about 4:00pm we will be showing the "Max Goes to the Moon" video. Max Goes to the Moon is about a dog who is being honored with a parade for having rescued the space station crew. This is a kids planetarium program, designed for grades 2-5 in elementary school. The video is approximately 35 minutes long. All Ames employees are cordially invited.

Abstract: A concept for a new space-based cosmology mission called the Dark Ages Radio Explorer (DARE) will be presented in this talk. DARE's science objectives include (1) When did the first stars form? (2) When did the first accreting black holes form? (3) When did Reionization begin? (4) What surprises does the end of the Dark Ages hold (e.g., Dark Matter decay)? DARE will use the highly-redshifted hyperfine 21-cm transition from neutral hydrogen to track the formation of the first luminous objects by their impact on the intergalactic medium during the end of the Dark Ages and during Cosmic Dawn (redshifts $z=1135$). It will measure the sky-averaged spin temperature of neutral hydrogen at the unexplored epoch 80-420 million years after the Big Bang, providing the first evidence of the earliest stars and galaxies to illuminate the cosmos and testing our models of galaxy formation. DARE's approach is to measure the expected spectral features in the sky-averaged, redshifted 21-cm signal over a radio bandpass of 40-120 MHz. DARE orbits the Moon for a mission lifetime of 2-3 years and takes data above the lunar farside, the only location in the inner solar system proven to be free of human-generated radio frequency interference and any significant ionosphere.

Bio: Jack Burns is a Professor in the Department of Astrophysical and Planetary Sciences and Vice President Emeritus for Academic Affairs and Research for the University of Colorado Boulder. He is also Director of the NASA Lunar Science Institute's Lunar University Network for Astrophysics Research (LUNAR), a NASA-funded center. Burns received his B.S. degree, magna cum laude, in Astrophysics from the University of Massachusetts. He was awarded a Ph.D. in Astronomy from Indiana University. From 2001 through 2005, Burns served as Vice President for Academic Affairs & Research for the University of Colorado System. He was Associate Dean for the College of Arts and Sciences at New Mexico State University (NMSU). Burns was Department Head and Professor in the Department of Astronomy at NMSU from 1989 until 1996. During his tenure at the University of New Mexico from 1980 to 1989, Burns served as the Director of the Institute for Astrophysics and was a Presidential Fellow. He was a postdoctoral fellow at the National Radio Astronomy Observatory from 1978 to 1980. Burns has 370 publications in refereed journals, books, and in conference proceedings and abstracts (as listed in NASA's Astrophysics Data System). Burns is an elected Fellow of the American Physical Society and the American Association for the Advancement of Science. He received NASA's Exceptional Public Service Medal in 2010 for his service on the NASA Advisory Council (NAC) and as Chair of the NAC Science Committee.

2012-4: Director’s Colloquium by Dr. Colonel M.V. “Coyote” Smith

On Wednesday, April 18th, at 10 a.m. in the Space Sciences Auditorium (N245), Colonel M.V. “Coyote” Smith will present a Director’s colloquium entitled “Shift Happens: Security in The Age of Surprise.” All Ames employees are cordially invited to attend.

Abstract: Colonel Smith will discuss revolutionary emerging technologies with prefixes such as nano-, bio-, cyber-, nuc-, climate-, astro-, proto-, and hyper-. He considers himself to be neither a scientist nor an engineer, but instead a strategist and future scientist. Most of his time is spent interpreting the implications of new and emerging technologies and their social, political, security, and ethical concerns. He will provide his view of what the future holds in the 2035 and 2050 time frame.

Bio: Colonel M.V. “Coyote” Smith, PhD, is the Director of the US Air Force Center for Strategy and Technology (Project Blue Horizons) at Maxwell Air Force base, AL, where he also serves as a Professor of Strategic Space Studies at the School of Advanced Air and Space Studies. He is also an associate director of the Eisenhower Center for Space and Defense Studies at the US Air Force Academy. Before completing his PhD at the University of Reading in the UK, the Colonel served as the Chief of “Dream Works,” which was the Future Concepts shop in the Pentagon’s National Security Space Office. Dream Works developed, explored, advocated, and linked future concepts, capabilities, and promising technologies to advance the art of space faring across the security and civil sectors. He was the director of the Space-Based Solar Power Study, for which he and his team received the Space Pioneer Award for 2008. He is the Chief Futurist of the Air Force. His passion is to advance the interests of nation-states through normal, competitive, government exploration and subsequent commercial development of space.

2012-5: Director's Colloquium by Dr. Charles (Charlie) Pellerin

On Thursday, May 31st, at 10:00 am in the Syvertson Auditorium (N201), Dr. Charles Pellerin will present a Director's Colloquium entitled "The Fifth-Force." This colloquium has relevance to everyone at the Center. Both the Ames staff and our summer interns are cordially invited to attend.

Abstract: Scientists and engineers spend many years learning how to experiment and design within the constraints of Mother Nature's four forces. These forces are the strong force (nuclear), the weak force (radioactivity), the electromagnetic force, and the gravitational force. Successful project managers and effective team leaders understand that while it is necessary to address Mother Nature's forces, it is not sufficient. These people know that they must measure and manage the "fifth-force" that governs human behavior. This force is "team social context." How can I be so sure about the connection between team social context and success? I learned the hard way, leading the team that built Hubble Space Telescope for nearly a decade, ignoring the fifth force, then discovering that I was responsible for arguably the biggest screw-up in the history of science. Hubble's Failure Review named the failure, a "Leadership Failure." I will show you how easy it is to manage the "fifth-force," quantitatively boosting your team performance. The processes have refined with the experiences of the 1,000+ NASA teams who all chose to voluntarily use "4-D" processes.

Bio: Dr. Pellerin holds a PhD in Astrophysics, and an MBA from Harvard Business School's "Program for Management Development". As NASA Director of Astrophysics, he led a multi-billion dollar program for a decade, launching 12 satellites. Charlie invented the Great Observatories program which garnered over \$8B for space astrophysics. Charlie then developed NASA's post-cold-war strategy, for which NASA awarded him the Distinguished Service Medal. In 1993, he joined the University of Colorado's Business School as a professor of Leadership. He taught undergraduates, MBAs, and executives. His recent book "How NASA Builds Teams" has Amazon's highest rating. His 4-D process is widely used throughout the world.

2012-6: Director's Colloquium by Dr. David Morrison

On Tuesday, June 12th, at 2 p.m. in the Syvertson Auditorium (N201), Dr. David Morrison will present the first colloquium in the 2012 Director's Colloquium Summer Series entitled, "Danger from the Sky: Real and Imagined." This is an opportunity to learn about asteroids and their threats to our planet from one of the leading experts in the field. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Asteroids and comets occasionally strike the Earth with catastrophic consequences. The dinosaurs, who did not have a space program to detect and deflect such objects, paid the price. We can do better, and we have made a substantial start on an international planetary defense effort. Many in the public, however, are focused on imaginary dangers. Millions of people believe that a rogue planet called Nibiru is inbound and will "destroy the Earth" in December of this year. Many people seem to be much more worried about phantom dangers than real ones, challenging us to better communicate the science of cosmic collisions.

Biography: David Morrison is Senior Scientist at the NASA Lunar Science Institute and also serves half-time as Director of the Carl Sagan Center for Study of Life in the Universe at the SETI Institute. For 20 years he has led in defining the asteroid impact threat. Now he also struggles against pseudoscience; he is the leading scientific critic of the 2012 doomsday hoax.

2012-7: Director's Colloquium by Karen Bradford

On Tuesday, June 19th, at 2 p.m. in the Syvertson Auditorium (N201), NASA Ames Chief of Staff, Karen Bradford, will present the third colloquium in the 2012 Director's Colloquium Summer Series entitled, "Being NASA – Where do you fit on the meatball?" This is an opportunity to learn about what it is like to work at NASA from her perspective as Chief of Staff. Her presentation will be followed by a reception in the lobby of Building 200. All of Ames staff and especially our summer interns are cordially invited.

Abstract: This talk will provide some insight into the key contributions and dynamics of the communities that makes up the NASA "meatball". Everyone has a part to play on the NASA Team. Everyone. Whether you are in Science, Technology or Mission Support, each person is an integral part of the NASA family. The meatball has been described as a ball of engineering wrapped in a thin veneer of Science. It is important to remember that just because you live in the thin veneer, it does not mean the rest of the meatball does not exist. The same goes for living in the ball of engineering/technology! For that matter, the red pulse and atomic energy of the mission support community is what gives the meatball life and is just as important as the rest of the community. Orienting where you fit on the meatball will provide insight and awareness into what it takes to be a part of the amazing NASA Team and what role you play in its success.

Biography: Karen C. Bradford is the Chief of Staff at NASA Ames Research Center, and has served as a civil servant for 24 years. Serving as Chief of Staff at NASA Ames includes a variety of complex and changing challenges that range from managing VIP visits, national and international, to administering various processes and interactions that are critical to the success of the Center and the Agency. Karen's work for NASA began as Executive Assistant to Dr. Baruch Blumberg, Director, NASA Astrobiology Institute (NAI) where she planned, implemented and served as project lead for the first NAI Minority Institution Faculty Sabbatical. In 2005, Karen was selected as a member of the National Coalition of 100 Black Women, Silicon Valley Chapter. Karen often speaks or guest teaches at local parish organizations during the year, is an accomplished singer, plays piano and cantors most recently for St. Lucy Parish Church in Campbell, CA. She is a very proud mother of 5 and grandmother of 5.

2012-8: Director's Colloquium by Dr. William Warmbrodt

On Tuesday, June 26th, at 2 p.m. in the Syvertson Auditorium (N201), Dr. William Warmbrodt will present the third colloquium in the 2012 Director's Colloquium Summer Series entitled, "Rotorcraft Research at NASA Ames Research Center." Dr. Warmbrodt will describe how unique technical expertise and national test facilities has made Ames a world's leader in helicopter and advance rotary wing technology. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Since the days of the NACA, Ames Research Center has been a world's leader in helicopter and advance rotary wing technology. Today, NASA Ames continues to develop the technology to improve aerodynamic efficiency and mission performance for existing helicopters and tilt rotor aircraft and to enable new vertical lift aircraft designs. Working jointly with the U.S Army Aeroflightdynamics Directorate (AFDD) and the U.S. Air Force Arnold Engineering Development Center, NASA Ames conducts scientific experimentation, numerical modeling, wind tunnel testing, and flight research in helicopters and advanced rotorcraft. The presentation will cover recent technology developments in civilian and military vertical lift aircraft development with a focus on NASA Ames' unique technical expertise and national test facilities, including the NASA Vertical Motion Simulator, the U.S. Air Force National Full-Scale Aerodynamics Complex, and the U.S. Army AFDD Flight Projects Office.

Biography: William Warmbrodt received his BS, MS, and PhD degrees in engineering from the University of California at Los Angeles. He also holds a MS in management from Stanford. Dr. Warmbrodt is an expert on full- and small-scale experimental research into rotor dynamics and aerodynamics, and analytical research into rotor aeroelasticity, performance, loads, and controls. He has been Chief of the Aeromechanics Branch at Ames since 1985. Currently he manages over 20 full-time NASA scientists and engineers in rotorcraft and rotary wing analytical and experimental research in aeromechanics and flight controls. He has been involved in many aspects of rotary wing technology, including serving as Editor-in Chief (1986-1987) of the American Helicopter Society Journal.

2012-9: Director's Colloquium by Dr. Chris McKay

On Tuesday, July 3rd, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Chris McKay will present the fourth colloquium in the 2012 Director's Colloquium Summer Series entitled, "Antarctica: Cold and Dry Like Mars - But a Lot Closer." Dr. McKay is a world renowned planetary scientist and expert on Mars. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Antarctica is the coldest, driest continent on Earth and is therefore an interesting analog for Mars. Over the years we have been studying three microbial ecosystems found in the dry valley regions of Antarctica: the endolithic algal and lichen layer inside porous sandstone rocks, microbial mats at the bottom of ice-covered lakes, and life in ice-cemented ground under dry permafrost at very high elevations. These studies suggest that early Mars could have been quite cold and still supported liquid water environments and life. The national and commercial programs that provide access to Antarctic provide interesting examples of how access to the Moon might develop.

Biography: Dr. Christopher P. McKay is a planetary scientist with the Space Science Division of NASA Ames. McKay received his Ph.D. in astrogeophysics from the University of Colorado in 1982, and has been a research scientist with the NASA Ames Research Center since that time. His current research focuses on the evolution of the solar system and the origin of life. He is also actively involved in planning for future Mars missions including human settlements. McKay has been involved with polar research since 1980, traveling to the Antarctic Dry Valleys, the Atacama Desert, the Arctic, and the Namib Desert to conduct research in these Mars-like environments. Dr. McKay is a recipient of the Urey Award from the Division of Planetary Sciences of the American Astronomical Society for his contributions.

2012-10: Director's Colloquium by Dr. Natalie Batalha

On Tuesday, July 10th, at 2 p.m. in the Main Auditorium (N201), Dr. Natalie Batalha will present the fifth colloquium in the 2012 Director's Colloquium Summer Series entitled, "The Road to ExoEarth: Latest Results from NASA's Kepler Mission." This is an opportunity to get a current update on one of the coolest missions that NASA has ever launched. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Humankind's speculation about the existence of other worlds like our own turned into a veritable quest with the launch of NASA's Kepler spacecraft in March 2009. The mission is designed to survey a slice of the Milky Way Galaxy to identify planets orbiting other stars. It looks for the telltale dimming of light that occurs when an orbiting planet passes in front of the star thereby casting a shadow into space. She will give us an update on the latest results, as Kepler has now discovered more than 1,000 new planet candidates, nearly doubling its previously known count. Ten of these candidates are near-Earth-size and orbit in the habitable zone of their host star. Now in its fourth year of operation, Kepler is honing in on the answer to the question that drives the mission: are potentially habitable worlds abundant in our galaxy.

Biography: Dr. Natalie Batalha is a professor of physics and astronomy at San Jose State University and co-investigator on NASA's Kepler Mission. She holds a bachelor's in physics from the University of California (UC), Berkeley, and a doctorate in astrophysics from UC Santa Cruz. Dr. Batalha started her career as a stellar spectroscopist studying young, sun-like stars. After a post-doctoral fellowship in Rio de Janeiro, Brazil, Dr. Batalha returned to California. Inspired by the growing number of exoplanet discoveries, she joined the team led by William Borucki at NASA's Ames Research Center working on transit photometry -- an emerging technology for finding exoplanets. Thirteen years later, she stands poised with the Kepler team to make discoveries that humans, up to now, have left to the imagination and the realms of science fiction.

2012-11: Director's Colloquium by Dr. S. Pete Worden

On Thursday, July 12th, at 2 p.m. in the Syvertson Auditorium (N201), NASA Ames Center Director, Dr. S. Pete Worden, will present the sixth colloquium in the 2012 Director's Colloquium Summer Series entitled, "The Search for Life in the Universe and Our Future." This is an opportunity to learn about Ames' world-class effort in astrobiology and synthetic biology. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: As we continue to seek for evidence of life beyond Earth, two sources of new data come to the fore. The first is our search for places that could support life. Locations where liquids and sources of energy exist have been the focus of NASA's recent efforts. We've found a number of such places in the solar system where these requirements might be met. Recently we've begun to identify numerous planets in other solar systems that could, in principle, have liquid water on their surfaces. A second new source of insight into our search for life comes from our own technology development. In particular, the emerging field of synthetic biology suggests that we ourselves and presumably extra terrestrial intelligence could engineer life to exist in much broader ranges of conditions that we find on the Earth's surface. In this lecture I will discuss the status of these two developments and their implications for our search for life.

Biography: Dr. Simon P. Worden (Brig. Gen., USAF, ret.) is the center director at NASA Ames Research Center where he leads a staff of nearly 2500 civil servants and contractors, and oversees an annual budget of approximately \$800 million providing the critical R&D support that makes NASA's and the nation's aeronautics and space missions possible. Prior to becoming Ames director, Dr. Worden was a Research Professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona where his primary research direction was the development of large space optics for national security and scientific purposes and near-earth asteroids. Additionally he worked on topics related to space exploration and solar-type activity in nearby stars. He is a recognized expert on space issues < both civil and military. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences, and strategic studies. Moreover, he served as a scientific co-investigator for two NASA space science missions.

2012-12: Director's Colloquium by Dr. Adam Arkin

On Monday, July 16th, at 3:00pm. in the Main Auditorium (N201), Dr. Adam Arkin, Professor of Bioengineering and Director of the Synthetic Biology Institute at UC Berkeley will present a Director's Colloquium entitled, "Synthetic biology and engineering approach to designing complex function in cells." While this presentation is not officially part of the Director's Colloquium 2012 Summer Series, all of our staff and our summer students are cordially invited to come learn about the emerging field of synthetic biology. His presentation will be followed by a reception in the lobby of Building 200. Please note that the colloquium is next Monday, July 16th at 3:00pm.

Abstract: To meet the goal of creating reliable, predictable, efficient, and transparent methods to harness cellular capabilities for human benefit, it is necessary both to have standard libraries of elements from which useful pathways can be constructed and an understanding of how host physiology and the environment impacts the functioning of these heterologous circuits. We show how variations in cellular and environmental context affect the operation of the basic central dogma functions underlying gene expression. Then we describe progress on creating a complete, scalable, and relatively homogeneous and designable sets of part families that can control central dogma function predictably in the face of varying configurations, genetic contexts, and environments. We show the challenges that arise in attempting this in applications such as a tumor destroying bacteria.

Biography: Dr. Adam Arkin is a Professor of Bioengineering at UC Berkeley, Director of the Physical Biosciences Division at Lawrence Berkeley National Lab, and Director of the Synthetic Biology Institute at UC Berkeley. The Arkin laboratory seeks to uncover the evolutionary design principles of cellular networks and populations and to exploit them for applications. To do so they are developing a framework to effectively combine comparative functional genomics, quantitative measurement of cellular dynamics, biophysical modeling of cellular networks, and cellular circuit design to ultimately facilitate applications in health, the environment, and bioenergy.

2012-13: Director's Colloquium by Dr. Pamela Marcum

On Tuesday, July 17th, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Pamela Marcum will present the seventh colloquium in the 2012 Director's Colloquium Summer Series entitled, "A Year of SOFIA Science." As Project Scientist for SOFIA, her primary responsibilities are to assure the scientific integrity of the mission and to provide advice and guidance to the SOFIA Program Office on scientific issues. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Stratospheric Observatory for Infrared Astronomy (SOFIA), an airborne observatory optimized for conducting astrophysical investigations across the infrared-to-sub-millimeter spectral range, is an international partnership between the U.S. and German space agencies. SOFIA's maiden science flight occurred in November 2010, followed by hundreds of additional flight hours using three of the seven 1st-generation instruments. This first year of SOFIA science covered Solar System to extragalactic astrophysics, and demonstrated various observation modes including instrument team science, peer-reviewed observations by the community, and a target of opportunity that required coordination of heroic proportions! Her presentation will highlight major SOFIA discoveries, describe the idiosyncrasies of operating a flying observatory, and outline the expanding potential for new investigations as the full instrument complement is commissioned.

Biography: Dr. Pamela Marcum began her research career with the study of white dwarf stars while an undergraduate at the Florida Institute of Technology, where she graduated with a B.S. and M.S. in Space Sciences and Physics. Her research direction changed to extragalactic astronomy while in graduate school, where she worked on the near-IR and optical properties of ring galaxies and galaxy groups, and also participated in Hubble Space Telescope Wide-Field and Planetary Camera-2 Science Definition Team activities. After receiving a Ph.D. in Astronomy at the University of Wisconsin-Madison, Dr. Marcum became a postdoctoral research associate at the University of Virginia where, with fellow team members of the Ultraviolet Imaging Telescope at NASA Goddard, she worked on the first extensive ultraviolet imaging of local galaxies. Before joining NASA Ames in 2009, Dr. Marcum worked for over a decade as a professor in the Department of Physics & Astronomy at TCU in Fort Worth, TX. For three of those years, she was appointed at NASA headquarters in Washington, D.C., serving as the Program Scientist for the WISE and Kepler missions, and managing the UV/optical/IR portfolio of the Research & Analysis grants program.

2012-14: Director's Colloquium by Dr. David Blake

On Tuesday, July 24th, at 2 p.m. in the Syvertson Auditorium (N201), Dr. David Blake will present the eighth colloquium in the 2012 Director's Colloquium Summer Series entitled, "Development and deployment of the CheMin Mineralogy Instrument on the Mars Science Laboratory." With its rover named Curiosity, Mars Science Laboratory mission is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the red planet, with the primary goal of determining the planet's habitability. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: The past 15 years of Mars exploration - by landers, rovers and orbiting spacecraft - has yielded a treasure trove of knowledge about the Red Planet. Each successive mission has carried with it a more capable, refined and nuanced science payload, building on the discoveries of its predecessors. The Mars Science Laboratory rover Curiosity is currently en route to Mars, to arrive at Gale Crater on Aug. 5th, 2012. Curiosity is the most sophisticated and capable rover yet and it will provide us with new knowledge of Mars' present climate and geology, and clues to its early habitability. "CheMin," one of the two laboratory instruments aboard Curiosity, was developed at Ames and will for the first time provide definitive mineralogy of soils and rocks on Mars.

Biography: David Blake received a B.S. in Biological Sciences from Stanford University in 1973. After graduation, he served as an unrestricted line officer in the US Navy until 1977. Blake attended graduate school at the University of Michigan, where he received an MS in Sedimentology in 1980 and a Ph.D. in Geology & Mineralogy in 1983. He came to Ames Research Center as a NRC postdoctoral fellow, and became a research scientist in the Exobiology Branch in 1989. Blake was the Exobiology Branch Chief from 2000-2004. He is the Principal Investigator of CheMin, a mineralogy instrument included in the payload of Mars Science Laboratory, which will land on Mars on August 5, 2012. In nearly 25 years at Ames, he has enjoyed studying astrophysical ices, interplanetary dust, carbonaceous chondrites and Mars meteorites, lunar soils and stratospheric soot, and designing spacecraft instruments.

2012-15: Special Thursday Director's Colloquium by Paul Saffo

On Thursday, July 26th, at 2 p.m. in the Syvertson Auditorium (N201), Paul Saffo will present a Director's Colloquium entitled, "Cyberspace, social media and the great turbulence: implications for global institutions." Paul Saffo is a Technology Forecaster and Consulting Professor in the School of Engineering at Stanford. He is frequently quoted in leading publications on issues ranging from high technology to global lifestyles. He has over two decades experience exploring long term technological change and its impact on society and is one of the most respected futurists in Silicon Valley. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: The 2008 crash was more than a downturn; it marked the end of the "Great Moderation" a two decade period of mild business cycles and steady growth. Now many fear we are headed towards a prolonged recession (or worse), while a small minority predict a new boom just around the corner. Both groups miss the point, for we have entered a new era defined not by boom or bust, but by a new kind of volatility that will be with us for at least a decade. The global economy has entered the "Great Turbulence," a decade-scale new order that will be characterized by high amplitudes, short cycles and scarce equilibrium. This shift will transform politics and policy globally, threaten incumbents and create particular challenges for institutions with long-term public missions. But amidst the challenges are also important opportunities for institutions that adapt themselves to the turbulent new order.

Biography: Paul Saffo is a forecaster with over two decades experience helping corporate and governmental clients understand and respond to the dynamics of large-scale, long-term change. He is Managing Director of Foresight at Discern Analytics and teaches at Stanford where he is a Consulting Associate Professor in the Engineering School. Paul is also a non-resident Senior Fellow at the Atlantic Council, and a Fellow of the Royal Swedish Academy of Engineering Sciences Paul is also Chair of the Futures & Forecasting Track at Singularity University. His essays have appeared in a wide range of publications including The Harvard Business Review, Foreign Policy, Fortune, Wired, The Los Angeles Times, Newsweek, The New York Times and the Washington Post. Paul holds degrees from Harvard College, Cambridge University, and Stanford University.

2012-16: Director's Colloquium by Dr. Lynn Rothschild

On Tuesday, July 31st, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Lynn Rothschild will present the ninth colloquium in the 2012 Director's Colloquium Summer Series entitled, "From Astrobiology to Star Trek: Synthetic biology and NASA's Missions." Lynn will discuss some of the exciting work we are doing in synthetic biology at Ames and how it can possibly revolutionize space exploration. Her presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Synthetic biology the design and construction of new biological parts and systems and the redesign of existing ones for useful purposes → has the potential to transform fields from pharmaceuticals to fuels. Our lab has focused on the potential of synthetic biology to revolutionize all three major parts of astrobiology: Where do we come from? Where are we going? and Are we alone? For the first and third, synthetic biology is allowing us to answer whether the evolutionary narrative that has played out on planet earth is likely to have been unique or universal. For example, in our lab we are re-evolving biotic functions using only the most thermodynamically stable amino acids in order to understand potential capabilities of an early organism with a limited repertoire of amino acids. In the future synthetic biology will play an increasing role in human activities both on earth, in fields as diverse as bio-mining, human health and the industrial production of novel bio-composites. Beyond earth, we will rely increasingly on biologically-provided life support, as we have throughout our evolutionary history. In order to do this, the field will build on two of the great contributions of astrobiology: studies of the origin of life and life in extreme environments. Imagine 4 billion years of evolution as a giant genetic hardware store, polish up your pipetemen, rev up your thermocycler, take aim with your gene gun and unleash your inner engineer!

Biography: Dr. Lynn Rothschild, is an evolutionary biologist/ astrobiologist at NASA Ames, and Professor at Stanford and Brown University, where she teaches Astrobiology and Space Exploration. She has broad training in biology, with degrees from Yale, Indiana University, and a Ph.D. from Brown University in Molecular and Cell Biology, and a love for protists and evolution. Since arriving at Ames in 1987, her research has focused on how life, particularly microbes, has evolved in the context of the physical environment, both here and potentially elsewhere, and how we might tap into "Nature's toolbox" to advance the field of synthetic biology. Field sites range from Australia to Africa to the Andes, from the ocean to 100,000 feet on a balloon. In the last few years Rothschild has brought her expertise in extremeophiles and evolutionary biology to the field of synthetic biology, addressing on how synthetic biology can enhance NASA's missions. For the last two years she has been the faculty advisor of the Brown-Stanford award-winning iGEM team. Rothschild is a Fellow of the Linnean Society of London, the California Academy of Sciences and the Explorers Club.

2012-17: Director's Colloquium by Dr. Chris Potter

On Tuesday, August 7th, at 2 p.m. in the Syvertson Auditorium (N201), Dr. Chris Potter will present the last colloquium in the 2012 Director's Colloquium Summer Series entitled, "Chapters from the "User's Manual for Research on Climate Change Impacts." Chris will present an up to date account of what we know about climate change in the context of research that is being carried out in the Earth Sciences Division. His presentation will be followed by a reception in the lobby of Building 200. All Ames employees and especially our Ames summer students are cordially invited.

Abstract: Global climate change has already had observable effects on Earth's biosphere. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted, and trees are flowering sooner. Impacts that scientists had predicted in the past would result from global climate change are now occurring: loss of sea ice, accelerated sea level rise, and more intense heat waves. Most scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gasses produced by human activities. Nonetheless, conclusive scientific studies of climate change impacts must be carried out over a time course of 50 to 100 years, while NASA's longest and best satellite records for monitoring the Earth are only 20-30 years old. This presents NASA researchers with many pressing challenges to overcome in using Earth Observations for climate change impact detection. This presentation will address many of these challenges and present new images of ecosystem change already underway around the world.

Biography: Dr. Christopher Potter is a Senior Research Scientist in the Biospheric Science Branch at NASA Ames Research Center. He holds a Ph.D. degree in forest ecology from Emory University with specialties in remote sensing applications for forest and woodland ecosystems, and has published nearly 100 journal articles. Dr. Potter was named an Ames Fellow in 2007 and has received several other NASA research awards in his 20-year career at Ames Research Center.

2012-18: 2012 H. Julian Allen Award Presentation by Dr. Jing Li

Jing Li, Yijiang Lu, Qi Ye, Martin Cinke, Jie Han, and Meyya Meyyappan were awarded the 2012 H. Julian Allen Prize for their paper entitled “Carbon Nanotube Sensors for Gas and Organic Vapor Detection”, published in *Nano Letters*, Vol. 3, pp. 929-933 (2003). On Thursday, September 20th, at 2pm in the Space Sciences auditorium (N-245), Dr. Jing Li, will give the 2012 H. Julian Allen Award presentation for the winning paper.

Abstract: Nanotechnology offers the ability to work at the molecular level, atom by atom, to create large structures with fundamentally new molecular organization. It is essentially concerned with materials, devices, and systems whose structures and components exhibit novel and significantly improved physical, chemical and biological properties, phenomena, and process control due to their nanoscale size. A nano-sensor technology has been developed at NASA Ames using nanostructure, single walled carbon nanotubes (SWNTs), combined with silicon-based microfabrication and a micromachining process. The nanosensors have achieved low detection limit of chemicals in the concentration range of ppm to ppb. More than 15 chemicals have been tested and differentiated. Due to large surface area, low surface energy barrier and high thermal and mechanical stability, nano-structured chemical sensors offer higher sensitivity, lower power consumption and a more robust solution than most state-of-the-art systems making them attractive for space and defense applications, as well as a variety of commercial applications. Leveraging the micro-machining technology, the light weight and compact sensors can be fabricated, in wafer scale for mass production, with high yield and at low cost. An example of a sensor module, the first space flown nano device, will be introduced in this presentation. Such sensors have drawn attention from the space community for global weather monitoring, space exploration, life search in the universe, and launch pad fuel leak detection and in-flight cabin air and life support system monitoring, and engine operation monitoring. Additionally, the wireless capability of such sensors can be leveraged to network mobile and fixed-base detection and warning systems for civilian population centers, military bases and battlefields, as well as other high-value or high-risk assets.

Bio: Jing Li received her Ph.D. in Materials Science and Engineering in 1996 from the University of Utah. She is currently a Principal Investigator in the NASA Ames TSS Branch, previous the Nanotechnology Branch. She leads the effort and has developed a first ever space qualified nano-sensor unit for a flight demonstration ride on a satellite that was launched and operated successfully in 2007. The nanotechnology based chemical sensor platform that she developed has drawn interest from other NASA centers, other government agencies, and many industry partners. She is a principle investigator (PI) on the Nano ChemSensor Unit project, which won the 2007 NASA Ames Center Honor Award. She received a Nano 50 innovator award in 2008 and the NASA Honor Award, Exceptional Technology Achievement medal, in 2011 Dr. Li is an internationally known expert in the field of chemical sensors. She has authored more than 45 peer review articles and has been awarded 9 US patents. Her research focus is on the chemical sensors development utilizing the nano-structured materials and a sensor array with signal processing techniques for making intelligent sensing systems.

2012-19: Director’s Colloquium by Ravi Prakash and Bobak Ferdowsi

As part of the 25th National Full-Scale Aerodynamics Complex (NFAC) anniversary celebration, Ravi Prakash and Bobak Ferdowsi from the Jet Propulsion Laboratory (JPL) will present a Director’s Colloquium entitled, “Curiosity: The Boldest Mission to Mars Ever.” The colloquium will take place in the Syvertson Auditorium (N201) from 1:30 - 2:30 p.m. on Tuesday, Dec. 11. After the colloquium a reception will be held in the Lobby of N200. Everyone at Ames is cordially invited to attend. A short abstract is given below:

Abstract:

The Mars Science Laboratory team at JPL dared mighty things by landing Curiosity on Mars on August 6. Curiosity continues to spark the imagination as it explores the Martian surface. Join Ravi Prakash and Bobak Ferdowsi (“Mohawk Guy”) as they take you through the events that led to Curiosity’s extraordinary landing, and find out what the rover has been doing ever since. Highlights include the role Ames played in Curiosity’s success.

Biographies:

Ravi Prakash joined JPL in 2005 as an Entry Descent and Landing Systems engineer. Ravi became a member of the MSL EDL team in 2007 where he helped design field tests for the radar and was the systems engineer for the heat shield instrumentation suite called MEDLI (which was designed in part at Ames). Ravi is currently helping with the MSL EDL reconstruction effort and is already designing a future Mars lander. Ravi has a Bachelor of Science in Aerospace Engineering from The University of Texas at Austin, and a Master of Science in Aerospace Engineering from the Georgia Institute of Technology.

Bobak Ferdowsi is a Flight Director and member of the Engineering Operations Team on the Mars Science Laboratory (MSL) Curiosity Project at JPL. He earned his Bachelor of Science degree in Aeronautics and Astronautics in 2001 from the University of Washington and subsequently his Master of Science in the same area from Massachusetts Institute of Technology. Bobak has always wanted to work on missions to Mars. He plays shortstop in the Jet Propulsion Laboratory softball league and usually rides his bike to work.

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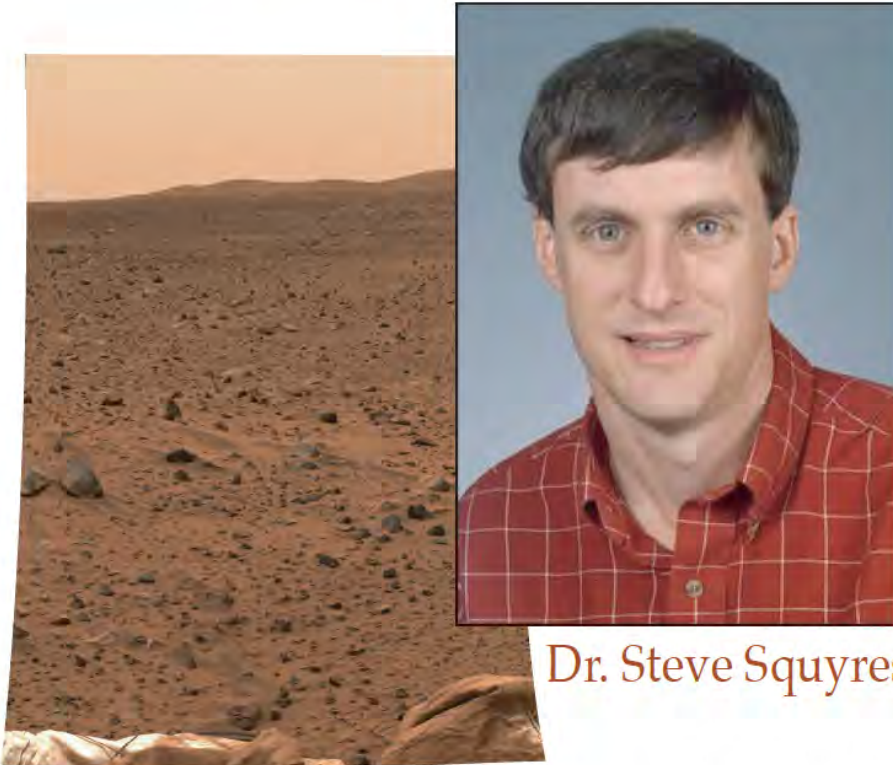
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**Selected Posters Used In Advertizing
The Colloquia To The Center**

Director's Colloquium



Dr. Steve Squyres

Come and hear Dr. Steve Squyres speak about the Mars Rovers, Spirit and Opportunity

When: Friday, July 30

Where: Main Auditorium (N201)

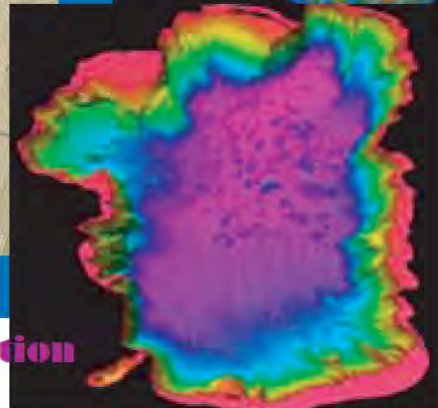
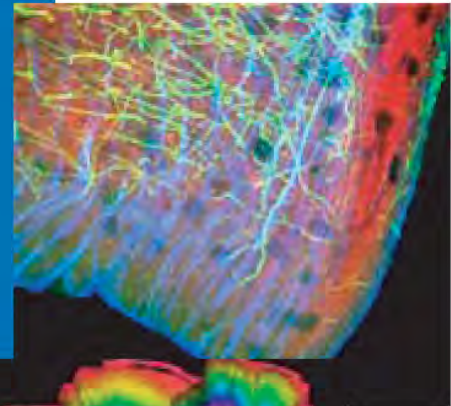
Time: 2:00 pm

Steven Squyres's research focuses on the large solid bodies of the solar system: the terrestrial planets and the satellites of the Jovian planets. His work involves analysis of data from both spacecraft and ground-based telescopes, as well as a variety of types of geophysical modeling. Areas of particular interest include the tectonics of Venus, the history of water on Mars, and the geophysics of the icy satellites of the outer planets. Data analysis and theory are used together to examine the processes that have shaped the surfaces and interiors of these bodies.

Squyres has participated in a number of planetary spaceflight missions. From 1978 to 1981 he was an associate of the Voyager imaging science team, participating in analysis of imaging data from the encounters with Jupiter and Saturn. He was a radar investigator on the Magellan mission to Venus, a member of the Mars Observer gamma-ray spectrometer flight investigation team, and a co-investigator on the Russian Mars '96 mission. Dr. Squyres is currently the scientific Principal Investigator for the Mars Exploration Rover Project. He is also a co-investigator on the Mars Express mission, and on the Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment. He is a member of the Gamma-Ray



Remote Data Mining



Visualization

Collaboration

Come and hear Dr. Larry Smarr speak about optical networks, advanced super-computing, and the OptIPuter

When: Tuesday, August 10

Where: Main Auditorium

Time: 2:00 pm

Larry Smarr, age 54, attended the University of Missouri, earned a master's at Stanford University, and his doctorate from the University of Texas at Austin. In the 1970s, he was a postdoctoral fellow at Princeton University and a Junior Fellow in the Harvard University Society of Fellows. He joined the faculty of the University of Illinois at Urbana-Champaign Departments of Physics and of Astronomy in 1979. For two decades, Dr. Smarr conducted observational, theoretical, and computational based research in relativistic astrophysics, resulting in the publication of over seventy scientific papers.

In 1985 he was named the founding Director of the National Center for Supercomputing Applications (NCSA) at the University of Illinois. In October, 1997, he also became the Director of the National Computational Science Alliance, comprised of over fifty universities, government labs, and corporations linked with NCSA in a national-scale virtual enterprise to prototype the information infrastructure of the 21st Century. During the fifteen years that Dr. Smarr directed NCSA, the center made major contributions to the development of the Internet, the Web, the Grid, and scientific visualization.

In August 2000, Dr. Smarr moved to La Jolla, CA where he became a professor of the Jacobs School's Department of Computer Science and Engineering at the University of California at San Diego. Shortly thereafter he became the founding Institute Director of the California Institute for Telecommunications and Information Technology. Dr. Smarr is a member of the NASA Advisory Council.

Director's Colloquium

When: Thursday, August 19
Where: Main Auditorium
Time: 2:00 pm



Michael R. Anastasio, Director
Lawrence Livermore National Laboratory (LLNL)

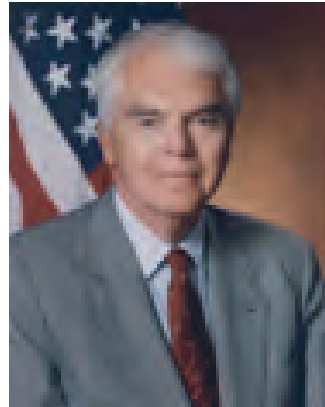
Creating a Star in the Laboratory and The Challenge of Stockpile Stewardship

Late last year, the National Ignition Facility (NIF) began its transition from a major construction project to the largest laser experimental facility in the world. Today, construction and commissioning are proceeding in parallel with physics experiments. When all 192 beams are operating, NIF will make possible experiments that will allow scientists to examine the processes that power the sun and stars as well as the inner workings of nuclear weapons. NIF is a key element of the National Nuclear Security Administration (NNSA) Stockpile Stewardship Program (SSP), which ensures the safety and reliability of the nation's nuclear stockpile. In his talk, Dr. Anastasio will describe the major accomplishments, challenges, and future promise of NIF as an introduction to the SSP. The talk will summarize other key elements of the SSP, with particular emphasis on Advanced Simulation and Computing and LLNL's high-performance computing strategy. The 100-teraop Purple machine and BlueGene/L platform are scheduled for delivery early in 2005. Dr. Anastasio will also highlight a few examples of LLNL's ongoing R&D efforts with NASA and discuss opportunities for future collaborations.

Dr. Anastasio has a PhD in Physics from the State University of New York, Stony Brook. He joined the Laboratory in 1980 and was appointed the ninth Director of LLNL by the University of California Board of Regents in July, 2002. Founded in 1952, LLNL is one of the nation's two nuclear design laboratories and has been operated since its inception by the University of California, currently for the National Nuclear Security Administration (NNSA) within the U.S. Department of Energy.

Director's Colloquium

When: Monday September 20
Where: Main Auditorium
Time: 2:00 pm



Professor Hans Mark,
University of Texas at Austin

Electro-Magnetic Guns for the Navy

In 1999, a decision was made by the U.S. Navy's leadership to adopt the concept of an all-electric integrated power system for the next generation of surface warships, the DD(X) destroyer. The excess electric power available on these ships made it a practical proposition to arm them with electro-magnetic guns. These weapons are not limited by the thermodynamic constraints imposed on the muzzle velocities of conventional guns. A projectile fired by an electro-magnetic gun with a muzzle velocity of 2500 meters/second can achieve a range of about 450 kilometers. Such a weapon would clearly have important new military capabilities. The Navy has recently put a program in place to develop these weapons with funding of about \$250 million for five years. The current status of this program and the future prospects will be discussed.

Dr. Mark specializes in the study of spacecraft and aircraft design, hypervelocity projectiles and impact, and national defense policy. Currently he holds the John J. McKetta Centennial Energy Chair in Engineering in the College of Engineering at the University of Texas at Austin. He served as chancellor of The University of Texas System from 1984 to 1992. He previously taught at Boston University, Massachusetts Institute of Technology, University of California at Berkeley, and Stanford University. Dr. Mark has served as director of the NASA-Ames Research Center, Secretary of the Air Force, Deputy Administrator of NASA and most recently, the Director of Defense Research and Engineering. He has published more than 180 technical reports and authored or edited eight books. Dr. Mark is a member of the National Academy of Engineering and an Honorary Fellow of the American Institute of Aeronautics and Astronautics.

Director's Colloquium

When: Thursday, January 20
Where: Main Auditorium
Time: 2:00 pm



Professor Sally Ride,
University of California, San Diego

Encouraging Girls and Women in Science and Engineering

Dr. Sally Ride received her B.S. and Ph.D. in Physics from Stanford University. As the first American woman in space, she is a veteran of two shuttle flights where she deployed communications satellites, operated the robot arm, and conducted experiments in materials, pharmaceuticals, and Earth remote-sensing. In 1989, Dr. Ride joined the faculty at UCSD as a Professor of Physics and Director of the University of California's California Space Institute. In 2001 she founded her own company, Imaginary Lines, to pursue her long-time passion: motivating girls and young women to pursue careers in science, math and technology. Long an advocate for improved science education, Dr Ride has written four science books for children: *To Space and Back*; *Voyager*, *The Third Planet*, *The Mystery of Mars* and *Exploring Our Solar System*. Dr. Ride has been a member of many prestigious committees, including the President's Committee of Advisors on Science and Technology and the National Research Council's Space Studies Board. Dr. Ride has been inducted into the National Women's Hall of Fame, the Astronaut Hall of Fame and has received numerous honors and awards, including the Jefferson Award for Public Service, the von Braun Award, and the Lindbergh Eagle.

Director's Colloquium

When: Tuesday, February 22
Where: Main Auditorium
Time: 2:00 pm



Mr. Paul Otellini
President and Chief Operating
Officer of Intel

Riding Moore's Law

Mr. Paul Otellini will discuss the status and future implications of Moore's Law. Potential topics include applications in supercomputing including NASA's Project Columbia and a view into the next inflection points in the computing and communications industry.

As Intel's president and chief operating officer, Paul S. Otellini is responsible for all internal operations. Otellini has been elected to serve as the fifth chief executive officer of Intel, effective in May of 2005, succeeding Craig R. Barrett.

Otellini joined Intel in 1974 and has served as president and COO since 2002, the year he also was elected to Intel's board of directors. From 1998 to 2002, he was executive vice president and general manager of the Intel Architecture Group, responsible for the company's microprocessor and chipset businesses and strategies for desktop, mobile, and enterprise computing. From 1992 to 1998, Otellini served as executive vice president of sales and marketing. Previously, he served as general manager of the Microprocessor Products Group, leading the introduction of the Pentium® microprocessor that followed in 1993.

Otellini holds a bachelor's degree in economics from the University of San Francisco and a master's degree from the University of California at Berkeley.

Director's Colloquium

When: Thursday, April 21st
Where: Main Auditorium
Time: 2:00 pm



Jonathan Dorfan
Director, Stanford Linear Accelerator Center
Professor of Physics, Stanford University

THE NEW UNIVERSE

In his talk, Jonathan Dorfan will illustrate the revolutionary new challenges facing particle physics. Recent information from cosmological measurements have shown that over 95% of the universe is dark and that all the matter that has been so precisely studied by physicists in the post-war period represents only 5% of the total mass of the universe. Prof. Dorfan will concentrate on three principle questions: What is Dark Matter? What is Dark Energy? and Where is the Anti-matter? He will explain what is being done in High Energy Physics worldwide to address these questions and also what facilities are planned for the future.

Dr. Dorfan received his B.S. from the University of Cape Town, South Africa and his Ph. D. in physics from the University of California, Irvine. He has been a Professor at Stanford's Linear Accelerator Center since 1989, and Director of Stanford Linear Accelerator Center since 1999. He is a Fellow of the American Academy of Arts and Sciences and of the American Physical Society. Currently he is the Chair of the International Committee on Future Accelerators and on the Board of the Weizmann Institute of Science. His research interests encompass elementary particle physics and advanced accelerator design.

Director's Colloquium

When: Thursday, April 28th
Where: Main Auditorium
Time: 10:00 am



Dr. William F. Ballhaus, Jr
President and CEO of The Aerospace Corporation

The 10 Most Important Lessons You Didn't Learn in Engineering School

Come hear Dr. Bill Ballhaus' Top 10 Lessons for career advancement and programmatic excellence. He will draw on his broad experience at NASA, in industry, and at The Aerospace Corporation. As President and CEO of The Aerospace Corporation, he runs an organization widely known as "The Architect of National-Security Space." Aerospace has had a hand in every government launch vehicle and satellite program since 1960, and is heavily involved in helping transform every sector of military space with next-generation systems.

Prior to joining Aerospace in 2000, he had an 11-year career with Lockheed Martin Corporation. At Lockheed Martin Dr. Ballhaus served as corporate officer and vice president, Engineering and Technology. Prior to the merger with Lockheed, Dr. Ballhaus served as president of two Martin Marietta businesses, Aero and Naval Systems, and Civil Space and Communications. He also was vice president and program director of Titan IV Centaur operations at Martin Marietta Space Launch Systems.

Dr. Ballhaus began his career at NASA Ames Research Center as a research scientist in 1971 and rose to become Director of Ames (1984-1989). He also served as acting associate administrator for Aeronautics and Space Technology at NASA Headquarters in Washington, D.C. (1988-1989). Dr. Ballhaus has been elected an honorary fellow of AIAA and was president of AIAA for the 1988-1989 term.

Director's Colloquium

When: Thursday, May 19th
Where: Main Auditorium
Time: 2:00 pm



Dr. Sylvia Earle
President and CEO of Deep Ocean Technology
explorer, oceanographer, diver extraordinaire

SUSTAINABLE SEAS Vision and Reality

In her talk, Dr. Sylvia Earle will discuss the state of the world's seas, including new techniques for ocean exploration, leading to new policies concerning ocean care. This is a story that everyone should hear, because ignorance about the oceans is the biggest obstacle to their protection.

Dr. Earle received her B.S. from Florida State University and her Ph. D. in botany from Duke University. She is a former chief scientist of the National Oceanic and Atmospheric Administration (NOAA) and a leading American oceanographer. She was among the first underwater explorers to make use of self-contained underwater breathing apparatus (SCUBA) gear and holds many deep diving records, such as the deepest free dive to 1,250 feet. She has been credited with identifying many new species of marine life, has authored many scientific publications, and has written several books including "Sea Change: A Message of the Oceans". She has been a leader in developing and building submersible craft for deep diving, such as "Deep Rover", which can operate to depths of 3000 feet. Currently, she is president and CEO of Deep Ocean Technology and Deep Ocean Engineering in Oakland, California.

Director's Colloquium

When: Monday, February 13th
Where: Space Sciences Auditorium
Time: 2:00 pm



Dr. Bernard H. Foing
Chief Scientist, European Space Agency

Smart-1 Results and Future Lunar Exploration

The European Space Agency's SMART missions- Small Missions for Advanced Research and Technology- are designed to test new spacecraft technology while visiting various places in the solar system. SMART-1 is now at the moon, mapping the surface mineralogy. Because SMART-1 is also testing miniaturized instruments, it is small, weighing only 367 kilograms. The SMART-1 ion engine is ten times more efficient than a conventional chemical propulsion engine. The engine operates by using electricity generated by the solar panel wings to charge the xenon gas propellant. The goals of the mission include mapping the surface to improve our knowledge of the global composition of the moon, studying the moon's impact history to help understand the bombardment record on Earth, and searching for water ice on the moon. Dr. Foing will discuss the the results of the mission and their implications for future lunar exploration.

Dr. Bernard Foing is the Chief Scientist of the European Space Agency. He participates in the SMART-1 mission as Project Scientist. He is also a co-investigator in the Mars Express project and acts as Executive Director of the International Lunar Exploration Working Group (ILEWG). His research interests include lunar exploration, solar-terrestrial relations, solar system history, spectroscopy, and interstellar chemistry.

Director's Colloquium

When: Monday, June 19th
Where: N-245 Auditorium
Time: 2:00 pm



Jeff Kuhn
Astronomer, Institute for Astronomy
University of Hawaii

Measuring the Sun from a small satellite -- microarcsecond astrometry

Dr. Kuhn will talk about the role that small satellites have had in solar research. Recent work has shown that a space platform for a small aperture solar telescope can yield astrometric solar information orders of magnitude more accurate than ground-based instruments. His talk explains why this is important, and describes recent progress toward measuring the Sun's shape and size with an accuracy approaching a few microarcseconds.

Dr. Kuhn received his PhD in Physics from Princeton University in 1981. Since then he has worked on a variety of problems, ranging from understanding why the Sun varies, to understanding what makes small satellite galaxies of the Milky Way so tenuous. He has worked as an astronomer with the National Optical Observatories in New Mexico and as a Professor of Physics and Astronomy at Michigan State University. He is presently an Astronomer with the Institute of Astronomy at the University of Hawaii. Jeff is presently developing a new type of telescope for Solar observing on Haleakala, with hopes of extending these ideas to much larger telescopes for observing a part of the universe that is currently invisible to all other instruments.

Director's Colloquium

When: Tuesday, June 27th
Where: N-245 Auditorium
Time: 3:00 pm



Jim Benson
Founder and Chairman of SpaceDev Inc.

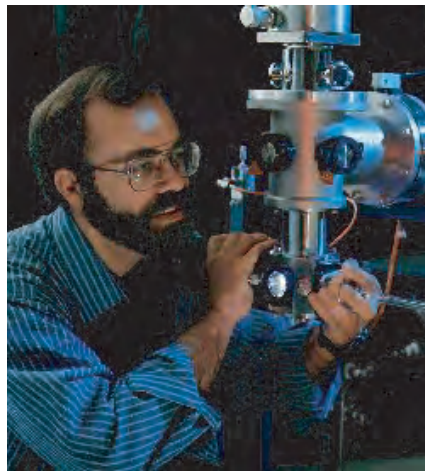
Revolutionizing Space for All Humanity

Mr. Benson will talk about opening the space frontier using small, low-cost missions to Earth orbit and beyond. Mr. Benson and SpaceDev are developing the world's first private sector enterprise to profitably explore and develop space beyond earth orbit. SpaceDev's mission is to help "make space happen" for all of humanity, through the development of a comprehensive private space program, by delivering innovative, affordable, practical and responsive space technologies.

Mr. Benson is the founding chairman and chief technology officer of SpaceDev, Inc., a publicly owned space exploration and development company. After a highly successful career as a computer industry entrepreneur, Mr. Benson took on the challenge of starting an innovative space commercialization venture. SpaceDev combines Mr. Benson's lifelong interests in science, technology and astronomy with his successful business experience. In 2004, unique hybrid rocket motors developed by SpaceDev powered Paul Allen's SpaceShipOne to win the \$10 million Ansari X Prize. In 2003, SpaceDev launched this country's smallest, low-cost, high performance satellite, CHIPSat for NASA. CHIPSat is a suitcase-size science microsatellite that is also the world's first orbiting Internet node, and the first satellite whose mission control and operations center is any laptop computer located anywhere in the world. He founded the non-profit Space Development Institute, and introduced the Benson Prize for Amateur Discovery of Near Earth Objects. He is Vice-Chairman and private sector representative on NASA's national Space Grant Review Panel. Mr. Benson received a Bachelor of Science degree in Geology from the University of Missouri at Kansas City

Director's Colloquium

When: Thursday, July 20th
Where: N-201 Auditorium
Time: 2:00 pm



Scott Sandford
Research Scientist, Astrophysics Branch
NASA Ames Research Center

STARDUST: Returning Samples from Comet Wild-2

On January 2, 2004, the STARDUST spacecraft made a close flyby (236 km) of the nucleus of a comet - Comet Wild 2. During the flyby the spacecraft collected samples of dust from the coma of the comet using aerogel impact collectors. These samples were returned safely to Earth on January 15, 2006 - they represent the first solid sample return since the Apollo era and the first solid sample return ever from outside the Earth-Moon system. Dr. Sandford will discuss the scientific goals of the STARDUST mission, provide an overview of the missions design and flight, and show some of the exciting data returned by the spacecraft during its encounter with the comet. He will also present the details for the recovery, disassembly, and transportation of the Return Capsule when it returned to Earth. Finally, he will provide an overview of the exciting things (some expected, some not) discovered from the returned samples.

Dr. Sandford is a member of Ames' Astrophysics Branch and is a co-leader (with Louis J. Allamandola) of Ames' Astrochemistry Laboratory. He has extensive experience in the fields of meteoritics. He is an editor of the journal Meteoritics and Planetary Science and has helped find many meteorites in Antarctica. Dr. Sandford also does extensive work in the areas of laboratory astrophysics and astrochemistry, and infrared astronomy (ground-based and airborne). Current laboratory interests include the study of the physical, chemical, and spectroscopic properties of polycyclic aromatic hydrocarbons and astrophysical ice analogs relevant to interstellar, cometary, and planetary environments. Dr. Sandford is also a Co-Investigator on the STARDUST Discovery Mission .

Director's Colloquium

When: Monday, September 18th

Where: N-245 Auditorium

Time: 1:30 pm



Professor Jonathan Dowling
Professor of Theoretical Physics
Louisiana State University

The Second Quantum Revolution

Abstract: We are currently in the midst of a second quantum revolution. The first quantum revolution gave us new rules that govern physical reality. The second quantum revolution will take these rules and use them to develop new technologies. In this review we discuss the principles upon which quantum technology is based and the tools required to develop it. We discuss a number of examples of research programs that could deliver quantum technologies in coming decades including; quantum information technology, quantum electromechanical systems, coherent quantum electronics, quantum optics, and coherent matter technology. NASA applications are to vastly improved quantum computers, quantum communications, quantum sensors, and quantum enhanced global and planetary positioning systems.

Bio: Jonathan P. Dowling is a Horace C. Hearne Jr. Professor of Theoretical Physics and Co-Director the Hearne Institute for Theoretical Physics, Louisiana State University, Baton Rouge, Louisiana. Prof. Dowling received his PhD in mathematical physics from the University of Colorado at Boulder in 1988. He was a Postdoctoral Research Scientist at the Max Planck Institute for Quantum Optics in Garching, Germany. He was also a National Research Council postdoctoral research associate in the Science & Technology group at Army Aviation and Missile Command (AMCOM), Redstone Arsenal, Alabama, before joining AMCOM as a Research Physicist in 1994. He then left AMCOM to take a position in 1998 as a Research Scientist and Supervisor of the Quantum Computing Technologies Group at NASA JPL. He took up his current post in Louisiana in 2004. Dowling has over 120 published articles and holds eight US patents. He is a Fellow of the Institute of Physics and of the Optical Society of America.

Director's Colloquium

When: Wednesday, October 25th
Where: N-201 Auditorium
Time: 2:00 pm



Cosmologist, Professor Joel Primack
Writer/Philosopher Nancy Ellen Abrams

The View from the Center of the Universe

Abstract: Cosmologist Dr. Joel Primack and writer/philosopher Nancy Ellen Abrams will together present a Director's Colloquium along the lines of their best selling book "The View from the Center of the Universe". They will discuss how human perception of the Universe has changed over time as scientific discoveries have changed our understanding of our position within it. They will talk about the new scientific picture of the Universe that has evolved in the last 10-15 years, a Universe which remarkably is thought to contain 70% Dark Energy, 25% Cold Dark Matter, 4% Invisible Atoms, and less than 1% Visible Matter. They will show some of their spectacular videos of colliding galaxies based on calculations and simulations done on Project Columbia. This colloquium should be both understandable and visually spectacular. I highly recommend it.

Bio: Joel Primack is Professor of Physics at the University of California, Santa Cruz. In collaboration with colleagues from astronomy, he developed the "cold dark matter" theory. Currently he has been investigating the implications of various hypotheses regarding the identity of the dark matter for the formation and distribution of galaxies. He also works on science and technology policy. He and his wife, Nancy Ellen Abrams, are exploring the cultural implications of the ongoing revolution in cosmology and co-teach a popular UCSC course on Cosmology and Culture. Nancy Ellen Abrams has a bachelors degree in history and philosophy of science from the University of Chicago, and a law degree from the University of Michigan. She has worked at international law firms, at the Ford Foundation, and for the U.S. Congress.

Director's Colloquium

When: Monday, October 30th
Where: N-245 Auditorium
Time: 2:00 pm



Professor Dr. Hans-Peter Roeser
Director of the Institute of Space Systems
University of Stuttgart, Germany

SOFIA and the Small Satellite Program at the University of Stuttgart

Abstract: Dr. Roeser will first discuss the activities and research in the German SOFIA Institute (DSI), which include the management of the German engineering and scientific contributions to the SOFIA operations phase. He will then outline the University of Stuttgart's small satellite program which consists of a series of four satellites, starting with the "Flying Laptop", to be launched in early 2008 into Low Earth Orbit (LEO). It will be used for remote sensing and as a technology development program to test payloads and subsystems. The second and third small satellite of the series will be test beds for new electrical propulsion systems with a payload to do astronomy, and a re-entry test vehicle, respectively. The fourth small satellite will be named "Lunar Mission BW1". This satellite will have a mass of about 200 kg and a volume of 1x1x1 m³ to be launched 2010+ as a piggy back passenger. To operate the satellites the institute has its own ground station with UHF, VHF, L-band, S-band and Ka-band antennas.

Bio: Hans-Peter Roeser received the Diploma in physics in 1976 and the Ph. D. degree in 1979 from the University of Bonn, Germany. From 1974 – 1994 he was with the Max-Planck-Institute for Radioastronomy in Bonn where he has held a number of positions in the Department of Millimeter and Submilli-meter/FIR Technology. From 1994 - 2002 he was Director of the Institute of Space Sensor Technology at the German Aerospace Center (DLR) in Berlin and Professor at the Technical University of Berlin. Since 2002 he is Professor at the University of Stuttgart and Managing Director of the Institute of Space Systems (IRS). His main interest is the development and application of remote sensing instruments in the visible and infrared wavelength range for airborne and space-borne programs.

Director's Colloquium

When: Tuesday, November 14th
Where: N-245 Auditorium
Time: 1:00 pm



Dale Cruikshank
Research Scientist, Astrophysics Branch
NASA Ames Research Center

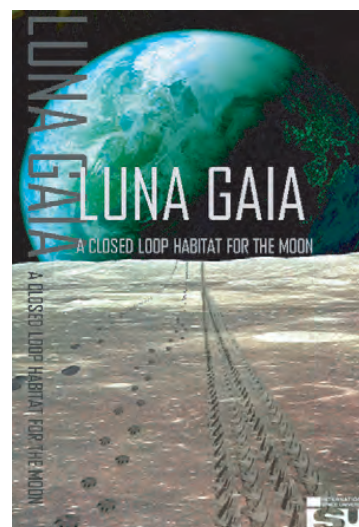
Complex Organic Matter on Small Bodies of the Solar System

Abstract: Simple carbon-bearing molecules in the solid state have been known as ices on the surfaces of small bodies in the Solar System since the detection of methane on Pluto. From an observational viewpoint such materials tend to impart a color to the surface on which they are present. Early lab work on the synthesis of organic solids by energy deposition in gas and ice mixtures (mostly related to Titan) showed that the production of highly colored solids is straightforward, but that the chemical analysis of the material is not. In addition to recent detections of specific classes of complex hydrocarbons on the satellites of Jupiter and Saturn, more recent laboratory work has begun to illuminate the entire subject of complex organic solids, their origins in the pre-solar cloud, the solar nebula, and on planetary bodies which are currently chemically active. This work underscores the point that together with rock, metal, and ice, organic solids are an essential component of bodies in the Solar System.

Dr. Dale Cruikshank has pioneered the application of infrared spectroscopy to small bodies in the outer Solar System (OSS). His discoveries confirm the conjecture that ices are the dominant component of OSS bodies. With colleagues, he discovered the five ices known on Triton, the three ices known on Pluto, and water ice on four large satellites of Uranus, two satellites of Saturn, Neptune's satellite Nereid, and Pluto's satellite. With colleagues, he was first to find H₂O ice in the Kuiper Belt, and methanol ice on a Centaur that links these bodies to comets. In his colloquium, he will discuss his contributions to planetary science that resulted in his winning the prestigious 2006 Gerard P. Kuiper Prize for Planetary Sciences.

Director's Colloquium

When: Thursday, November 16th
Where: N-245 Auditorium
Time: 3:00 pm



LUNA GAIA: A CLOSED LOOP HABITAT FOR THE MOON

Abstract: Luna Gaia posits a pathway to new technologies, philosophies, systems applications and infrastructure aimed at achieving a closed loop habitat model for human settlement on the moon. The framework supports an ideal profile for an optimum of 11 human crewmembers on the lunar surface for a period of 18-36 months. This presentation outlines the recommendations on the overall systems architecture, the engineering processes, as well as the research, development and orchestration of separately phased precursor missions by the year 2030. The Luna Gaia design solution focuses on optimizing the synergy between all regenerative processes of a network of closed loop life support systems. It also details the ethical and philosophical considerations of a lunar settlement and the wider implications for international law, policy and future interplanetary governance. Advancement of earth-based application of these processes are highlighted and strategies for effective information transfer and handling through education, media communication, outreach and advancement of future research.

Bio: "Thirty-two (32) authors representing eleven (11) nationalities and almost as many languages worked collaboratively on Luna Gaia as a team project for the Summer Session Program held at the International Space University, Strasbourg in 2006. Working in an interdisciplinary and intercultural environment to produce a comprehensive professional level report, the authors interacted with experts from academia, government and industry. The authors backgrounds range from physical sciences, life sciences, engineering, information technology, business and management, policy & law, arts & humanities, space applications and architecture with over 53% of them possessing masters or doctorate degrees. Luna Gaia was supported by the ISU faculty and teaching support staff and co-chaired by Pete Wordon, Alan Weston & William Marshall of the NASA Ames Research Centre. The executive summary and full report are available online at <http://ssp06.isunet.edu/> " Today's presentation will be given jointly by 12 of these 32 authors.

Director's Colloquium

When: Friday, November 17th
Where: N-245 Auditorium
Time: 3:00 pm



Roger Angel
Professor of Astronomy and Optical Sciences
University of Arizona

What might be done in space to mitigate global warming

Abstract:Space could be used both to slow the pace of global warming, and to reverse it if necessary. To hold the increase of atmospheric CO₂ to twice pre-industrial level, it will be necessary to generate most of the world's new electricity without fossil fuel. Solar energy from space could be a major source, if launch costs can be reduced, and if ways to fabricate kilometer scale structures in space are developed. 24-hour power from GEO would be relayed by microwaves to receiving centers spaced 2000 km apart, and could be distributed to all parts by conventional aluminum lines. This avoids the daytime/clear-sky limitation that applies to ground-based solar photovoltaic without a global superconducting grid. If it turns out that dangerous changes in global climate are in store even if all steps are taken to minimize CO₂ increases, then active cooling of the planet to reverse warming should be considered. I show that the minimum mass for an effective sunshade at L1 is 20 million tons. Electromagnetic launch from Earth followed by ion propulsion could get launch cost down to \$50/kg, given such large volume. Assembly in space would be avoided completely by making the sunshade as a cloud of 0.6-m sized autonomous spacecraft weighing 1 gram each, assembled completely on Earth and deployed in a cloud 6000 km in diameter and 100,000 km long.

Dr. Roger Angel received his BA from St. Peter's College, Oxford University, in 1963, his MS from California Institute of Technology in 1966, and his D Phil from Oxford University in 1967. Currently he is the Director of the Steward Observatory Mirror Laboratory, Director of the Center for Astronomical Adaptive Optics, and Regents Professor of Astronomy and Optical Sciences at the University of Arizona. He is a Fellow of the Royal Society and the Royal Astronomical Society, and a member of the American Academy of Arts and Sciences, and the National Academy of Science. His research interests span a wide range of disciplines, including adaptive optics, instrumentation, extrasolar planets, telescope design and optical fabrication, and interferometry.

Aeronautics Colloquium

When: Monday, November 20th
Where: N-201 Main Auditorium
Time: 3:00 pm



Professor Claire Tomlin
Electrical Engineering, UC Berkeley
Aeronautics and Astronautics, Stanford

Hybrid Control: from Air Traffic to Fly Wings

Abstract: Hybrid systems are a suitable model for representing systems that can transition between different behaviors. Many engineered systems are designed to be hybrid in order to simplify function and maintain flexibility in operation. For example, air traffic control systems involve transitions between simple flight modes for multiple aircraft. Hybrid systems are also a good framework for modeling natural systems: in cell biology, the dynamics that govern the spatial and temporal increase or decrease of protein concentration inside a single cell are continuous differential equations derived from biochemistry, yet their activation or deactivation is triggered by transitions which encode protein concentrations reaching given thresholds. In this talk, methods that have been designed to analyze, verify, and control hybrid systems will be presented. The methods use tools from game theory, wavefront propagation, and symbolic predicate abstraction, and rely on an iterative refinement procedure which computes, either exactly or approximately, regions of the system's operating space in which desired behavior is guaranteed.

Bio: Claire J. Tomlin is an Associate Professor in the Department of Electrical Engineering and Computer Sciences at the University of California at Berkeley, and is an Associate Professor in the Department of Aeronautics and Astronautics at Stanford University, where she also holds the Vance D. and Arlene C. Coffman Faculty Scholarship in the School of Engineering. She received a Ph.D. in Electrical Engineering from the University of California at Berkeley in 1998. She has held visiting research positions at NASA Ames and Honeywell Labs. Claire Tomlin has received many awards, including the highly prestigious MacArthur Fellow Award for 2006. Her research interests are in control systems, specifically hybrid control theory, and she works on air traffic control automation, flight management system analysis and design, and modeling and analysis of biological cell networks.

Director's Colloquium

When: Tuesday, December 12th
Where: N-245 Auditorium
Time: 3:00 pm



Professor Dirk Bouwmeester
Department of Physics
University of California, Santa Barbara

Optical cooling, nanophotonics, gravitational wave detectors, and spin-polarized He3

Abstract: By combining state of the art experimental techniques in solid-state nanofabrication and ultra low temperature physics (as developed by Professor Frossati at the University of Leiden, the Netherlands) it is possible to perform experiments that can span a large range of topics, from solid-state cavity Quantum Electrodynamics (QED) to gravitational wave detection. I will explain how to use optical fields to cool the motion of a tiny mirror from room temperature to 135 mKelvin, how to perform solid-state cavity QED using quantum dots in photonic crystals, how to measure gravitational waves using resonances of solid spheres, and how to produce and investigate spin polarized He3.

Bio: Dirk Bouwmeester received his Ph. D in physics at the University of Leiden in 1995. Currently, he is an Associate Professor of Physics in the Center for Spintronics and Quantum Computation at the University of California, Santa Barbara. Professor Bouwmeester is an expert in quantum optics and quantum information science. He has been involved in the first experimental demonstration of quantum teleportation, quantum cloning, 3-particle entanglement, and stimulated emission of entangled photons. He has pioneered new ways of studying the properties of microtubules by attaching colloidal quantum dots to biological molecules and observing their optical properties.

Director's Colloquium

When: Tuesday, January 9th
Where: N-201 Auditorium
Time: 10:00 am



Astronaut Jeff Williams
Expedition 13 Flight Engineer and Science Officer

Expedition 13 Debrief

Jeff Williams was the Expedition 13 Flight Engineer and Science Officer aboard the ISS. The Expedition 13 crew was launched on March 29, 2006 on the Russian Soyuz TMA 8 from Baikonur, Kazakhstan, docking with the station on March 31, 2006. During 6-months tour of duty aboard the International Space Station, in addition to station maintenance and some science activities, Williams performed two successful spacewalks, logging 12 hours and 25 minutes of EVA wearing both Russian and U.S. spacesuits. He also saw the arrival of two space shuttle missions, the resumption of construction of the orbiting laboratory, and the restoration of a three-person crew. The Expedition 13 mission concluded on September 28, 2006 with a safe landing in the steppes of Kazakhstan.

Williams received a bachelor of science degree in applied science and engineering from the U.S. Military Academy in 1980; a master of science degree in aeronautical engineering and the degree of aeronautical engineer from the U.S. Naval Postgraduate School, both in 1987; and a master of arts degree in national security and strategic studies from the U.S. Naval War College in 1996. He was selected to the NASA astronaut corps in 1996. In addition to Expedition 13, Williams flew aboard STS-101 Atlantis (May 19-29, 2000), the third Shuttle mission devoted to ISS construction.

The Ames experiments Williams worked on were launched aboard STS-121 on July 4, 2006. FIT (Fungal Pathogenesis, Tumorigenesis and Effects of Host Immunity in Space) examined the effects of space on the immune systems of fruit flies. Tropi flew plants to study how astronauts might grow food more efficiently in space in the future.

Director's Colloquium

When: Monday, January 22nd
Where: N-245 Auditorium
Time: 2:30 pm



Dr. Friedemann Freund
Carl-Sagan Center, SETI
Adjunct Prof., Physics Dept., SJSU

Physics of Pre-Earthquake Signals

Abstract: The “Holy Grail” of all earthquake research is to predict – within limits as narrow as possible – time, place and magnitude of major events. Seismologists build 30-year probability models principally based on the history of past earthquakes. However, one can greatly improve earthquake forecasting by taking into account the wide variety of pre-earthquake signals detectable from space and on the ground. Until now, the basic physics underlying the generation of these pre-earthquake signals was not understood. We recently discovered that stressed rocks turn into batteries, and that powerful electric currents can flow out of such rocks. Physically, the stress activates a specific type of dormant electronic charge carriers (associated with point defects). These charge carriers are defect electrons in the oxygen anion sublattice. They are positive holes (or pholes for short) representing O⁻/O²⁻ valence fluctuations. We furthermore show that these phole currents are the key element for explaining pre-earthquake signals: they can account for ionospheric perturbations, enhanced IR emission from the ground, and low frequency EM emissions. Finally, phole currents may also provide an explanation for the magnetic signature around impact craters on the moon and on Mars.

Bio: Dr. Friedemann Freund received his Ph. D. at Marburg University in Germany in Mineralogy/Crystallography. Prior to coming to Ames, he was Assistant Professor of Chemistry at the University of Gottingen, Germany (1962-1969), and Professor of Geosciences at the University of Cologne, Germany (1970-1987). He is currently a Principal Investigator in the Carl-Sagan Center, SETI Institute, and Adjunct Professor in the Physics Department at San Jose State University. In addition to rock physics in relation to earthquake and pre-earthquake phenomena, his research interests include defects in minerals and crystals, proton conductivity, prebiotic chemistry in the solid state, and the origin of Life.

Explorations of the *USS Macon* with Advanced Marine Technology

Director's Colloquium with
Chris Grech, MBARI
Steve Rock, Stanford University
January 31, 2:00 to 3:30
N201 Main Auditorium



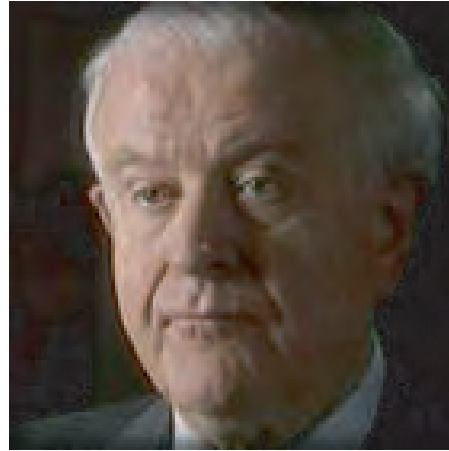
In September 2006 researchers from NOAA's National Marine Sanctuary program and the Monterey Bay Aquarium Research Institute in Moss Landing (MBARI) led an archeological expedition off the Big Sur coast at the submerged wreck site of the rigid airship *USS Macon*. The *Macon* crashed on February 12, 1935 as it headed back to its home base, in Hangar One at Moffett Field. Chris Grech, leader of the expedition to the *Macon*, will give an overview of the expedition and display the stunning images they collected. Steve Rock will then focus on the methods used to control the remotely operated underwater vehicle *Tiburon* as they compiled a mosaic portrait of the debris field.

Chris Grech is deputy director of marine operations at MBARI. Stephen Rock is a professor in the aeronautics and astronautics department of Stanford University and director of the Aerospace Robotics Laboratory.

This talk is co-organized by the NASA Ames History Office:
Glenn Bugos (4-6436, gbugos@mail)

Director's Colloquium

When: Tuesday, February 6th
Where: N-245 Auditorium
Time: 2:00 pm



Dr. Fred Singer, President
Science & Environmental Policy Project
Arlington, VA

Phobos and Deimos: Science and Missions

Abstract: What is the origin of the Martian moons and what can they tell us about the planet's early history? A manned mission, using the moons as a base, may be the most cost-effective way to explore these scientific questions in the near term. There seem to be no show-stoppers, but certain technical issues must be addressed to minimize costs and maximize benefits.

Bio: S. Fred Singer, professor (emeritus) of environmental sciences at the University of Virginia, is the founding president of the Arlington (VA)-based Science & Environmental Policy Project. SEPP is a non-profit, educational association of scientists concerned with providing a sound scientific base for environmental policies. Singer has held several academic and governmental positions, including as the first director of the US Weather Satellite Service (now part of NOAA), deputy assistant administrator for policy of the Environmental Protection Agency, and most recently, chief scientist of the US Department of Transportation. In addition to atmospheric and climate issues, his research publications cover a wide range of planetary problems, including the Earth's ionosphere, magnetosphere, and exosphere, and the origins of the Moon and satellites of Mars.

Director's Colloquium

When: Thursday, February 8th

Where: N-245 Auditorium

Time: 10:00 am



Dr. Olivier Guyon
Subaru Telescope
Hilo, Hawaii

The TOPS Mission Concept: Finding planets around nearby stars

Abstract: Dr. Guyon will explain the scientific potential and the technical challenges of the Telescope to Observe Planetary Systems (TOPS) mission concept, including describing what sorts of planets TOPS can detect around nearby stars. He will also focus on the extremely stringent mission requirement of rejecting all but 1 part in 10 billion of the light from a planet's parent star. Dr. Guyon will explain how the Phase Induced Apodization Coronagraph that he invented will achieve this very tight requirement as well as other aspects of the TOPS mission concept.

Bio: Dr. Olivier Guyon received his Ph. D. in physics from the University of Paris in 2002. He is currently an astronomer at the Subaru Telescope in Hawaii. He is a leading world expert in adaptive optics and the design and fabrication of optical coronagraphs for use in high contrast imaging with astronomical telescopes. Dr. Guyon was the Principal Investigator of the TOPS proposal he recently submitted to the NASA Discovery Program with Ames as a partner.

Director's Colloquium

When: Tuesday, March 13th
Where: N-201 Auditorium
Time: 10:00 a. m.



Tom Jones
Planetary Scientist and Shuttle Astronaut

Sky Walking: Human Space Exploration in the 21st Century

Abstract: Planetary scientist and veteran shuttle astronaut Tom Jones will discuss his new book, "Sky Walking: An Astronaut's Memoir," which details his experiences as mission specialist and payload commander aboard four space shuttle flights. Jones worked in orbit with payloads like the Space Radar Lab, deployable scientific satellites, and the planning and construction of the International Space Station. Dr. Jones will address our current direction in human space exploration and discuss the scientific and practical advantages (and shortcomings) of returning to the Moon and using the near-Earth asteroids as stepping-stones on the way to Mars.

Bio: Born and raised in Maryland, Tom Jones was a Distinguished Graduate of the United States Air Force Academy. During his career, he has piloted B-52s, earned a doctorate in planetary science from the University of Arizona, and worked for the Central Intelligence Agency. He entered the NASA astronaut program in 1990 and flew four missions on the space shuttle.

Dr. Jones's awards include the NASA Distinguished Service Medal, four NASA Space Flight Medals, the NASA Exceptional Service Award, and the NASA Outstanding Leadership Medal. A consultant, author, and scientist, he is active in the debate over the nation's future in space, and serves on the NASA Advisory Council. His website is www.AstronautTomJones.com.

Director's Colloquium

When: Tuesday, April 10
Where: N-245 Auditorium
Time: 2:00 pm



Dr. Paul Bevilaqua
Chief Engineer, Advanced Development Projects
Lockheed Martin Aeronautics Company

Inventing the Joint Strike Fighter

A Team led by Lockheed Martin recently won the contract to develop the F-35 Joint Strike Fighter, one aircraft that will be built in conventional, naval, and VSTOL variants. The key to developing this family of aircraft is a new dual cycle propulsion system, which can be switched from a turbofan cycle to a turboshaft cycle to increase thrust. This presentation will discuss the JSF competition and the development of this innovative airplane, and describe the Skunk Works approach to innovation and how it evolved to incorporate advances in Computer Aided Engineering.

Dr. Paul Bevilaqua has spent much of his career developing Vertical Take Off and Landing aircraft. Bevilaqua joined Lockheed Martin as Chief Aeronautical Scientist of the Lockheed Advanced Aeronautics Company, and became Chief Engineer of Advanced Development Projects in the Lockheed Martin Skunk Works. During this time he played a leading role in creating the Joint Strike Fighter Program. Bevilaqua invented the Lift Fan Propulsion System that made it possible to build a stealthy, supersonic Vertical Take Off and Landing aircraft, and led the engineering team that demonstrated the feasibility of building conventional and VTOL variants of this aircraft for the US Air Force and Marines, and the British Royal Navy. Prior to joining Lockheed Martin, Bevilaqua was Manager of Advanced Programs at Rockwell International's Navy aircraft plant, where he led teams designing VTOL interceptor and transport aircraft. He began his career as a Captain in the US Air Force and Deputy Director of the Energy Conversion Laboratory at Wright Patterson Air Force Base. Bevilaqua has a BS in Aerospace Engineering from the University of Notre Dame, and MS and PhD degrees in Aeronautics and Astronautics from Purdue University.

Director's Colloquium

When: Thursday, May 3
Where: N-201 Auditorium
Time: 1:00 pm



Robyn Beavers
Corporate Environmental Programs Manager
Google

The Googleplex goes Solar

Google will soon begin installation of 1.6 megawatts of solar photovoltaic panels at their Mountain View campus. This project will be the largest solar installation on any corporate campus in the U.S. The panels will cover the roofs of the four main buildings of the Googleplex, and also those of two additional buildings across the street. There will also be a portion of this installation on new solar panel support structures in a few parking lots. The amount of electricity that will be generated is equivalent to powering about 1,000 average California homes. Google will use the electricity generated to power several of their Mountain View office facilities, offsetting approximately 30% of their peak electricity consumption at those buildings.

On Thursday, May 3rd at 1:00 pm in the main auditorium (N201) Robyn Beavers, who is the Corporate Environmental Programs Manager at Google, will discuss the installation project. Following her colloquium, we will have a panel discussion on solar panels. The panelists include Robyn Beavers (Google), Steve Frankel, who will discuss the effort to install solar panels at Ames, and Stephanie Langhoff, Walt Brooks, and Scott Sandford, who will discuss their home installations. Steve Hipskind, Chief of the Earth Sciences Division, will MC the event. Following the panel discussion, there will be a reception in the lobby of Building 200. All of staff is cordially invited to attend. Come find out about one mechanism that you have for reducing your carbon usage and help make the world "greener".

Director's Colloquium

When: Wednesday, May 9
Where: N-201 Auditorium
Time: 2:00 pm



Nobel Laureate, John Mather
Senior Astrophysicist
NASA Goddard Space Flight Center

From the Big Bang to the Nobel Prize and Beyond

Abstract: The Cosmic Background Explorer (COBE) satellite, proposed in 1974 and launched by NASA in 1989, measured the cosmic microwave and infrared background radiation from the Big Bang and everything that happened later. The COBE team made three key measurements: the spectrum of the cosmic microwave background radiation (CMBR) matches a blackbody within 50 ppm, the CMBR is anisotropic, with 10 ppm variations on a 7 degree angular scale, and the cosmic infrared background from previously unknown objects is as bright as all the known classes of galaxies. The first measurement confirmed the Hot Big Bang theory with unprecedented accuracy, the second is interpreted as representing quantum mechanical fluctuations in the primordial soup and the seeds of cosmic structure and the basis for the existence of galaxies, and the third is still not fully understood. I will describe the project history, the team members, the hardware and data processing, the major results, and their implications for science, and end with the outlook for future progress with new background measurements and large telescopes such as the James Webb Space Telescope.

Bio: Dr. Mather is a senior astrophysicist at the NASA Goddard Space Flight Center in Maryland and adjunct professor of physics at the University of Maryland, College Park. He was awarded the 2006 Nobel Prize in Physics, shared with George F. Smoot for "their discovery of the black body form and anisotropy of the cosmic microwave background radiation". This work helped cement the big-bang theory of the universe using the COBE satellite. Dr. Mather joined the Goddard Space Flight Center in Greenbelt, Maryland to head the Cosmic Background Explorer (COBE) Mission as Project Scientist. He has been a Goddard Fellow since 1994 and currently serves as Senior Project Scientist and Chair of the Science Working Group of the James Webb Space Telescope (JWST) Mission.

Director's Colloquium

When: Wednesday, June 6, 2007
Where: Ballroom of the Ames Training and Conference Center (Building 3)
Time: 2:00 PM



Douglas Shane SpaceShipOne
Test Pilot and Flight Controller on
the Ansari X Prize winning flight

“Risk Management in the Deep End of the Pool – Winning the X-Prize”

This presentation will describe the origins of the SpaceShipOne program, design considerations, ground testing, crew training, and flight test results. In 2004, Scaled Composites won the Ansari X-Prize for flying two flights with the equivalent payload of 3 people, above 100 km altitude, twice within two weeks. This required developing a total vehicle system, including a launch aircraft, the SpaceShipOne vehicle, hybrid rocket propulsion, avionics, a simulator, and significant support infrastructure. For a company that had previously been as high as 63,000 ft and .72 Mach, the program requirements of 328,000 ft and 3.2 Mach were considerable corporate envelope expansions.

Doug Shane is Vice President/Business Development, Director of Flight Operations, and Test Pilot for Scaled Composites. He has 21 years experience in aircraft flight test, design, program management, and business development, with particular expertise in research aircraft developmental flight test. He has been the Flight Operations Director at Scaled since 1989, and has been directly responsible for the safe performance of more than 25 research flight test programs. Mr. Shane holds a Bachelor of Science in Aerospace Engineering from the University of Kansas, Lawrence, KS, 1982.

Director's Colloquium

When: Tuesday, September 18

Where: N-245 Auditorium

Time: 2:00 pm



Phil Sadler, Sadler Machine Co.
Professor Gene Giacomelli,
University of Arizona

Conceptual Lunar Habitat and Greenhouse

The presentation will first describe their efforts with the South Pole Food Growth Chamber. The chamber was built for the NSF/Office of Polar Programs and they are currently operating it remotely. They will next describe their efforts with the Mars Greenhouse and Cable Culture system that they developed for inflatable space modules. The Mars Greenhouse was not necessarily something that could survive on Mars, but was constructed to demonstrate the light weight growing system and the possibility of using natural sunlight on Mars. The whole greenhouse weighs about 250 lbs. The picture above shows Phil Sadler and Gene Giacomelli inside the Mars Greenhouse. Finally, they will present their Lunar Habitat Model. The Lunar Habitat is about 5' across and the inflatable module is the size of a "Concertina". They will show a short video showing the construction of the Lunar Greenhouses and Post Harvest Module.

Philip D. Sadler presently owns and operates Sadler Machine Co., a small machine shop in Tempe, Arizona, and works in cooperation with the University of Arizona's Controlled Environment Agriculture Center in inventing, developing, and fabricating, controlled environment hardware for polar and space environments. Recent projects include a Conceptual Lunar Greenhouse Design, Mars Greenhouse, and NSF's South Pole Food Growth Chamber. He has a B.S. in botany.

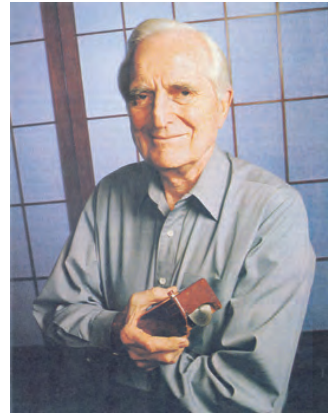
Dr. Gene Giacomelli is Professor and Director of the Controlled Environment Agriculture Program at the University of Arizona. He received a Ph. D. in Horticultural Engineering from Rutgers University in 1983. His research interests include controlled environment plant production systems (greenhouse and growth chamber) research, design, development and applications, with emphases on: crop production systems, nutrient delivery systems, environmental control, mechanization, and labor productivity.

Director's Colloquium

When: Wednesday, October 24

Where: N-258 Auditorium

Time: 10:30 am



Dr. Douglas Engelbart

Augmenting Human Intellect

For decades, my dominant goal has been to boost mankind's collective capability for understanding and coping with our most complex, urgent problems. The complexity-urgency factors are increasing at an accelerating rate, while the collective capability to understand and deal with them is falling ever farther behind. Ultimate consequence ...? I'll outline the "Bootstrapping-Strategy Framework" that I've developed: "Facilitating the Co-Evolution" of multiple societal and technological innovations towards "Boosting our Collective IQ" -- explicitly breaking the paradigms that still bind us to the outdated print technology. Then I'll focus on early "Tool-System" innovations that enable more-flexible evolution to get underway, with smooth transition from "Legacy Tools and Documents/Files" towards the necessary, future "Open Hyperdocument System" (OHS).

Douglas Engelbart received a Bachelor's degree in Electrical Engineering from Oregon State University in 1948. Over 1948-1951, he worked at the NACA Ames Aeronautical Laboratory (now named the NASA Ames Research Center). He received a Ph.D. in Electrical Engineering and Computer Science from Berkeley in 1955. In 1957, he joined Stanford Research Institute (now SRI International) and established the Augmentation Research Center which focused on augmenting human intellect. The lab pioneered a hypermedia system called NLS (for on-Line System). At the 1968 Fall Joint Computer Conference in San Francisco, Dr. Engelbart made the first public demonstration of the computer mouse, hypermedia, and on-screen video teleconferencing. Additional pioneering designs from the Augmentation Research Lab include hypermedia publishing, multiple windows, and integrated hypermedia email. In 1989, he and his daughter founded the Bootstrap Institute to create high-performance organizations by developing enabling technologies. Dr. Engelbart has authored over 25 publications and generating 20 patents (including the patent for the computer mouse). In 2000, President Clinton presented him with the National Medal of Technology, the United States' highest award for technological achievement.

Director's Colloquium

When: Friday, November 16th
Where: N-201 Auditorium
Time: 2:00 pm



Professor George Donohue
Director of the Center for Air
Transportation Systems Research
George Mason University, Virginia

Air Transportation: A Tale of Prisoners, Sheep and Autocrats

Abstract: Dr. Donohue's research at George Mason University has focused on treating the nation's air transportation system as a complex adaptive system with 6 interacting layers. Most of these layers are non-linear networks, characterized by stochastic feedback control systems. His research in the Center for Air Transportation Systems Research (CATSR) has focused on collecting and analyzing the probability density functions that characterize these networks. This data is then used to build computer models of the entire interacting system. As we gain a better understanding of the true nature of this critical transportation system and its adaptive mechanisms, we evaluate both policy and technical modifications that may improve the overall system performance.

Bio: George Donohue has a Ph.D. in Mechanical and Aerospace Engineering, an M.S. in Mechanical and Aerospace Engineering, and a BSME in Mechanical Engineering. From 1994 to 1998, he was the Associate Administrator of Research and Acquisition at the Federal Aviation Administration, and is currently a Professor of Systems Engineering and Operations Research in the Volgenau School of Information Technology and Engineering at George Mason University in Virginia. He is also a Senior Research Professor in the School of Public Policy and the founding Director of the Center for Air Transportation Systems Research at George Mason University. He has won numerous awards, such as the Secretary of Defense Meritorious Civilian Service Medal in 1977 and the Air Traffic Control Association Clifford Burton Memorial Award in 1998. He has published over 60 reports and articles and is the editor of the principle reference book on Air Transportation Systems Engineering. He has been listed in Who's Who in America since 1992, was named one of Federal Computer Week's top 100 Executives in 1997, and was also named one of the top 100 decision makers in Washington, D.C. by the National Journal in 1997.

Director's Colloquium

When: Tuesday, November 27th
Where: N-201 Auditorium
Time: 1:00 pm



Dr. Marcia McNutt
President and CEO
Monterey Bay Aquarium Research Institute

Ocean Exploration for the 21st Century

Abstract: The ocean is Earth's largest living space and contains most of its biomass. Yet 95% of the ocean is unknown and unexplored. Fortunately, with recent technological innovations, we now have the tools necessary to undertake a systematic exploration of the ocean. Autonomous underwater vehicles can be preprogrammed to execute precise surveys throughout the water column lasting up to weeks without pause. Remotely operated vehicles equipped with physical, chemical, and biological sensors function as our eyes, ears, noses, and hands in the deep sea. Ocean observatories extend multidisciplinary studies into the 4th dimension of time. New data base systems allow the systematic cataloguing, archiving, and dissemination of information that cannot be reduced to a simple list of numbers, allowing researchers who did not participate in the explorations to answer questions that could not have even been posed when the data were collected. The discoveries being made with these new tools range from new pathways for energy flow through the marine food web to processes responsible for the creation of submarine canyons.

Bio: Dr. Marcia McNutt received her PhD in Earth Sciences at Scripps Institution of Oceanography in La Jolla, California. After a brief appointment at the University of Minnesota, she spent the next three years at the US Geological Survey in Menlo Park, California, working on the problem of earthquake prediction. In 1982, she joined the faculty at MIT in Cambridge, Massachusetts. At MIT, she was appointed the Griswold Professor of Geophysics and served as Director of the Joint Program in Oceanography and Applied Ocean Science and Engineering, a cooperative graduate educational program between MIT and the Woods Hole Oceanographic Institution. Dr. McNutt's research ranges from studies of ocean island volcanism in French Polynesia to continental break-up in the Western U.S. to uplift of the Tibet Plateau. She has participated in 15 major oceanographic expeditions, and served as chief scientist on more than half of those voyages. She has published 90 peer-reviewed scientific articles. Dr. McNutt's honors and awards include membership in the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences.

Director's Colloquium

When: Wednesday, December 5th

Where: N-201 Auditorium

Time: 11:00 am



Martin Hoffert
Professor Emeritus of Physics
Department of Applied Science
New York University

Electricity from Orbit: The case for R & D

Abstract: Cost-effective space solar power (SSP)—the beaming of abundant high-intensity solar power from space through atmospheric windows at laser or microwave frequencies for electric power at the surface—could be a breakthrough technology for large-scale power generation, providing highly flexible power distribution and a sustainable carbon-neutral base load for Earth. Much higher than the surface mean solar flux, continuous sunlight in space avoids otherwise cost-prohibitive massive storage and transmission of intermittent terrestrial solar and wind power to match electric demand curves. SSP would be markedly accelerated by experiments feasible now, some employing ISS, including orbital mirrors and microwave and laser beaming in space. Marty will describe his proposed demo of wireless power transmission from geosynchronous orbit (GEO). This experiment would demonstrate continuous electric power transfer from orbit orders of magnitude greater than anything done before. With near-term and "on the shelf" components, early launch opportunities, and the ISS as testbeds, near-term experiments could accelerate SSP from paper studies to a real alternate energy option in as little as a three-to-five-year timeframe at a relatively modest cost.

Bio: Martin I. Hoffert is Professor Emeritus of Physics and former Chair of the Department of Applied Science at New York University. He has been on the research staff of the Curtiss-Wright Corporation, General Applied Science Laboratories, Advanced Technology Laboratories, Riverside Research Institute and National Academy of Sciences Senior Resident Research Associate at the NASA/Goddard Institute for Space Studies. Prof. Hoffert has published broadly in fluid mechanics, plasma physics, atmospheric science, oceanography, planetary atmospheres, environmental science, solar and wind energy conversion and space solar power. His research in alternate energy conversion includes wind tunnel and full-scale experiments on innovative wind turbines, photovoltaic generation of hydrogen, and wireless power transmission applied to solar power satellites. His present efforts focus on energy technologies that could stabilize climate change from the fossil fuel greenhouse—including (but not limited to) space solar power.

H. Julian Allen Award Presentation

When: Thursday, January 10th

Where: N-245 Auditorium

Time: 2:00 pm

UV Irradiation of Polycyclic Aromatic Hydrocarbons in Ices: Production of Alcohols, Quinones, and Ethers

Max Bernstein, Scott Sandford, Louis Allamandola,
Seb Gillette, Simon Clemett, and Richard Zare

Abstract: Great strides have been made in our understanding of interstellar material thanks to advances in infrared astronomy and laboratory astrophysics. Ionized polycyclic aromatic hydrocarbons (PAHs), shockingly large molecules by earlier astrochemical standards, are widespread and very abundant throughout much of the cosmos. In cold molecular clouds, the birthplace of planets and stars, interstellar molecules freeze onto dust and ice particles forming mixed molecular ices dominated by simple species such as water, methanol, ammonia, and carbon monoxide. Within these clouds, and especially in the vicinity of star and planet forming regions, these ices and PAHs are processed by ultraviolet light and cosmic rays forming hundreds of far more complex species, some of biogenic interest. Eventually, comets and meteorites seed primordial planets with these compounds, where they take part in the budding chemistry on these young worlds. The H. Julian Allen Colloquium will summarize how we have arrived at this understanding.

Presenters: The 2007 H. Julian Allen Award Lecture will be presented by Max Bernstein, Scott Sandford, and Louis Allamandola of the Space Sciences Division, and Professor Richard Zare of Stanford University. Since this paper was published in *Science* in 1999, it has received over 120 citations. The paper describes the first study of the irradiation chemistry of polycyclic aromatic hydrocarbons (PAHs) in realistic interstellar ice analogs, showing that such processing drives both oxidation and reduction reactions that create a diversity of functionalized PAHs of astrochemical and astrobiological significance. The research was enabled by combining the unique capabilities of the Astrochemistry Lab at Ames with the world-class laser laboratory at Stanford. A wine and cheese social event will follow the lecture in the upstairs lobby of N-245. All staff is cordially invited.

Director's Colloquium

Google-sponsored GREEN Seminar #4

When: Tuesday, February 5th

Where: N-201 Auditorium

Time: 2:00 pm



William McDonough

World-renowned architect and designer

Cradle to Cradle: A Celebration of Abundance

Abstract: Mr. McDonough will speak about his Cradle to Cradle philosophy and design practice. This vision of the hopeful, positive, and inspiring possibilities of an environmentally and economically intelligent future by design draws inspiration from the astonishing effectiveness of natural systems. Cradle to Cradle design, as opposed to “cradle to grave,” offers a new paradigm for human activity that creates a sustaining relationship with the natural world by emulating living systems that are effective, cyclical, synergetic, and regenerative.

Bio: William McDonough is a world-renowned architect and designer and winner of three U.S. presidential awards: the Presidential Award for Sustainable Development (1996), the National Design Award (2004); and the Presidential Green Chemistry Challenge Award (2003). Time magazine recognized him as a “Hero for the Planet” in 1999, stating that “his utopianism is grounded in a unified philosophy that—in demonstrable and practical ways—is changing the design of the world.”

Mr. McDonough has been a leader in the sustainable development movement since its inception. He designed and built the first solar-heated house in Ireland in 1977 while still a student at Yale University, and he designed the first “green office” in the U.S. for the Environmental Defense Fund in 1985. In 2002, he and German chemist Dr. Michael Braungart co-authored “Cradle to Cradle: Remaking the Way We Make Things.” Mr. McDonough is the founder of two design firms, including William McDonough + Partners, and he has created numerous landmarks of the sustainability movement since 1981, designing homes, offices, corporate campuses, academic buildings, communities, and cities.

Director's Colloquium

When: Tuesday, February 12th
Where: N-245 Auditorium
Time: 2:00 pm



Robotic Site Survey at Haughton Crater

Terry Fong and Matt Deans
Intelligent Robotics Group

Abstract: When NASA returns to the Moon, detailed surveys will be needed at a variety of sites in order to establish a lunar outpost. To investigate how robots can be used to perform this task, the Intelligent Robotics Group (IRG) recently conducted a field test at Haughton Crater in the Canadian Arctic. During July 2007, two NASA Ames K10 rovers, performed detailed surveys of several simulated lunar outpost sites. The rovers carried ground-penetrating radar developed at the Jet Propulsion Laboratory to map subsurface structure and a 3D scanning laser from Optech, Inc. to map terrain topography.

In this talk, we will present an overview of the Haughton Crater Site Survey Field Test, including field deployment, remote operations, and results. We will also provide an overview of the navigation, computer vision, and user interface software (including Google Earth and IRG's "Viz" tool) that enabled the K10 rovers to autonomously perform their surveys. We will conclude with remarks about how this work supports current NASA human-robotic system development and analog tests.

Bios: Dr. Terry Fong is the leader of the NASA Ames Intelligent Robotics Group. Prior to this, Dr. Fong was the deputy leader of the Virtual Reality and Active Interfaces Group at the Swiss Federal Institute of Technology. From 1997 to 2000, he was Vice President of Development for Fourth Planet, Inc., a developer of real-time visualization software.

Dr. Matthew Deans is the deputy leader of the NASA Ames Intelligent Robotics Group. He has been at Ames since 2002. Dr. Deans has participated in field robotics deployments in Antarctica, the Atacama Desert in Chile, Haughton Crater in the Canadian Arctic, and several sites in the Continental US.

Director's Colloquium

The Impact of Open Source Software on Space Exploration

October 28, 2008
N-201 Auditorium
11:00 AM



James Gosling

In 1977, James Gosling received a B.Sc in Computer Science from the University of Calgary. While working towards his doctorate, he wrote a version of emacs (gosmacs). Before joining Sun Microsystems, he built satellite data acquisition systems, a multiprocessor version of Unix, several compilers, mail systems and window managers. Since 1984, Gosling has been with Sun Microsystems, and is generally known best as the founder of the Java programming language. He did the original design of Java and implemented its original compiler and virtual machine. For this achievement he was elected to the United States National Academy of Engineering. He has written numerous books that provide the foundation of the Java programming language.

Dr. Gosling will discuss the importance of open source software, which has been a cornerstone of the Sun Microsystems business model. Today NASA conducts research and development in software and software technology as an essential response to the needs of NASA missions. Currently NASA has several options for the release of these NASA developed software technologies including using the NASA Open Source Agreement (NOSA). Dr. Gosling will relay his thoughts on what the impacts of open source software might be on NASA's space exploration program.

Director's Colloquium

When: Wednesday, November 12th
Where: N-245 Auditorium
Time: 2:00 pm



Professor Peter Michelson
Department of Physics
Stanford University

The Fermi Gamma-ray Space Telescope: The First 3 Months

Abstract: The Fermi Gamma-ray Space Telescope (formerly GLAST) was launched by NASA on June 11, 2008. The Large Area Telescope (LAT) instrument measures cosmic gamma-ray radiation in the energy range 20 MeV to >300 GeV, with measurements by the GLAST Burst Monitor (GBM) of gamma-ray bursts from 8 keV to 30 MeV. The LAT, with a large improvement in sensitivity, large field-of-view, and much finer angular resolution compared to previous high-energy telescopes, observes 20% of the sky at any instant and covers the entire sky every 3 hours. Fermi is providing an important window on a wide variety of high-energy phenomena, including pulsars, black holes and active galactic nuclei; gamma-ray bursts; the origin of cosmic rays and supernova remnants; and searches for new phenomena such as supersymmetric dark-matter annihilations and exotic relics from the Big Bang. I will describe the Fermi observatory and provide an overview of the observations made to date.

Bio: Dr. Michelson is a Professor of Physics at Stanford University. His research interests are in the field of high energy astrophysics, particularly X-ray and gamma-ray observations and instrument development. He led the international team (involving 18 institutions) that developed the next-generation orbiting high-energy gamma-ray observatory known as the Fermi Gamma-ray Space Telescope. Dr. Michelson is a past member of the NASA Office of Space Science Structure and Evolution of the Universe Subcommittee (SEUS), and served on the Committee on Gravitational Physics of the National Research Council, and the High-Energy Astrophysics Panel of the NRC Decadal Astronomy Survey Committee.

Director's Colloquium

January 22, 2009

**NASA Ames Conference Center
Building 3, Ballroom at 2:00 PM**

Lanekeeping Assistance at the Vehicle Handling Limits

*Professor J. Christian Gerdes
Department of Mechanical Engineering
Stanford University*



Each year there are approximately 40,000 fatalities on US roadways, 40% of which result from a collision with a fixed obstacle in the environment. Simply helping the driver keep the vehicle in the lane, therefore, could save thousands of lives. This talk describes an approach to driver assistance based on artificial potential fields that define the lane boundaries as hazards with the minimum hazard in the center of the lane. Analogous to a marble rolling in a valley, the lanekeeping assistance system attempts to nudge the vehicle back to the lane center. When the driver is tracking the lane, the car feels exactly how it would without any assistance; as the driver deviates from the center, the car gently adds an additional steering command, producing an effect much like being attached to the road with a light spring. He will address the key question of whether this system performs safely at the limits of handling when the demand forces exceed the friction available between the tires and the road.

Chris Gerdes is an Associate Professor of Mechanical Engineering at Stanford University, and Director of CarLab, a new community focused on automotive research at Stanford. Prior to joining Stanford, Dr. Gerdes was the project leader for vehicle dynamics at the Vehicle Systems Technology Center of Daimler-Benz Research and Technology North America. His research interests include the development of driver assistance systems for lane keeping and collision avoidance, modeling and control of novel combustion processes for internal combustion engines, and diagnostics for automotive drive-by-wire systems. Dr. Gerdes is a past recipient of the Presidential Early Career Award for Scientists and Engineers in recognition for his work with driver assistance systems.

Director's Colloquium

When: Tuesday, February 10th
Where: N-245 Auditorium
Time: 2:00 pm



Eric Roston
Science Journalist
Author of THE CARBON AGE

Do You Know How I Can Get There From the Interstellar Medium?

Abstract: We break the world down into categories of thought – boxes of a sort – to make it more comprehensible. Yet too much specialization obscures the simple and lovely story of how the world seems to work. Today, many of these categories, whether in our newspapers, congressional committees, or high school classes, are decades or centuries old, and no longer capture the acceleration of knowledge. We are continually inundated with stovepipe stories – Energy! Health! Climate! War!, their unifying tale left to decay in the background. Why not build an epic, singular narrative, starting from a universal common denominator and entwining science into our history, and history into current events?

Bio: Eric Roston is a science journalist in Washington, DC, and author of THE CARBON AGE: How Life's Core Element Has Become Civilization's Greatest Threat. He is also Senior Associate in the Washington, DC, office of The Nicholas Institute for Environmental Policy Solutions, of Duke University.

Previously, Roston wrote for TIME, where he covered economics, politics and technology. He joined the magazine in 2000 as a business reporter in the New York bureau, covering stories such as the collapse of Enron, China's emergence as a force in global trade, and how advanced computing technologies are reshaping the economy. An eyewitness to the collapse of the World Trade Center on Sept. 11, 2001, Roston was a part of the reporting team that won a National Magazine Award for best single-issue coverage.

Director's Colloquium

When: Tuesday, March 24th
Where: N-245 Auditorium
Time: 2:00 pm



Dr. Kenneth Ford
Director, Florida Institute for
Human & Machine Cognition

Toward Cognitive Prostheses

Abstract: The emerging concept of human-centered (HCC) computing represents a significant shift in thinking about intelligent machines and, indeed, about information technology in general. Human-centered computing embodies a "systems view," in which human thought and action and technological systems are seen as inextricably linked and equally important aspects of analysis, design, and evaluation. From an AI perspective, the HCC framework is focused less on stand-alone exemplars of mechanical cognitive talent, and is concerned more with computational systems designed to amplify human cognitive and perceptual abilities. This approach results in systems that can be regarded as cognitive or perceptual prostheses, much as eyeglasses are a sort of ocular prosthesis. This shift in perspective places human/machine interaction issues at the center of the subject. The "system" in question isn't "the computer," but instead includes cognitive and social systems, computational tools, and the physical facilities and environment. Thus, human-centered computing provides a new research outlook for AI applications, with new research agendas and goals.

Bio: Kenneth Ford is Founder and Director of the Florida Institute for Human & Machine Cognition (IHMC), an independent not-for-profit research institute. Ford is the author or co-author of hundreds of scientific papers and six books. Ford's research interests include: artificial intelligence, cognitive science, human-centered computing, and entrepreneurship in government and academia. He received a Ph.D. in Computer Science from Tulane University. He is Emeritus Editor-in-Chief of AAAI/MIT Press and has been involved in the editing of several journals. Dr. Ford is a Fellow of the AAAI. Dr. Ford has received many awards and honors including the Doctor Honoris Causas from the University of Bordeaux in 2005 and the 2008 Robert S. Englemore Memorial Award for his work in artificial intelligence.

Director's Colloquium

When: Friday, May 15th
Where: N-201 Auditorium
Time: 2:30 pm



Steven Squyres
Goldwin Smith Professor of Astronomy
Cornell University

Science Results from the Mars Exploration Rover Mission

Abstract:

The two Mars exploration rovers, Spirit and Opportunity, touched down on Mars in January 2004 and have been conducting extensive observations with the Athena science payload. Together the two rovers have traversed more than 20 km. Spirit, located on the floor of Gusev crater, has investigated basaltic plains, as well as older materials in the Columbia Hills. The rocks of the Columbia Hills are granular in nature and range from breccias to finely laminated deposits that have undergone significant alteration by water. Recently, Spirit has discovered silica-rich deposits that may have formed in a hot spring or fumarole environment. Opportunity has carried out the first outcrop-scale investigation of ancient sedimentary rocks on Mars. The rocks are sandstones formed by wind and water erosion and re-deposition of fine grained siliciclastics and sulfate-rich evaporites. While liquid water was present at Meridiani below and occasionally at the surface, the ancient environmental conditions recorded there are dominantly arid, acidic and oxidizing, and would have posed some significant challenges to life.

Bio: Steven Squyres's research focuses on the large solid bodies of the solar system: the terrestrial planets and the satellites of the Jovian planets. His work involves analysis of data from both spacecraft and ground-based telescopes, as well as a variety of types of geophysical modeling. Areas of particular interest include the tectonics of Venus, the history of water on Mars, and the geophysics of the icy satellites of the outer planets. Squyres has participated in a number of planetary spaceflight missions. Dr. Squyres is currently the scientific Principal Investigator for the Mars Exploration Rover Project. He is also a co-investigator on the Mars Express mission, and on the Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment. He is a member of the Gamma-Ray Spectrometer Flight Investigation Team for the Mars Odyssey mission, and a member of the imaging team for the Cassini mission to Saturn.

Director's Colloquium

When: Monday, June 1st
Where: N-245 Auditorium
Time: 2:00 pm



Dr. Antia Lamas-Linares
Assistant Professor of Physics
National University of Singapore

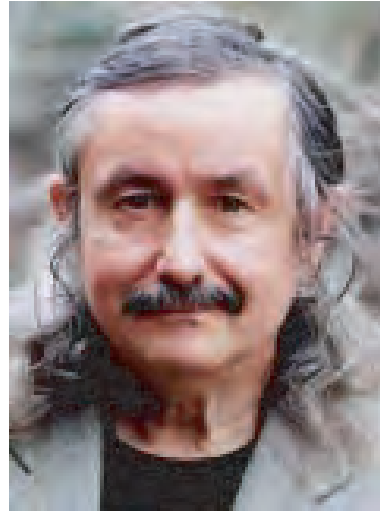
From Leggett inequalities to daylight quantum key distribution

Abstract: Entangled photons are extensively used both in fundamental tests of quantum mechanics and in quantum information applications such as quantum cryptography. In this talk I will touch upon both of these contexts. We have recently shown the violation of a Leggett inequality, which requires very high purity sources, and excludes a class of non-local realistic models. On the applied side of quantum information, we have performed a number of experiments on free-space entanglement based Quantum Key Distribution (QKD). She will describe the basic system, using models based on quantum correlations that have been proposed by Ekert and Bennett, Brassard and Mermin, and the steps necessary for the recent demonstration of daylight QKD.

Bio: Dr. Antia Lamas-Linares is an Assistant Professor of Physics at the National University of Singapore (NUS). Her experimental research is in the broad field of quantum information, and specifically optical implementations of quantum protocols. She received her Dphil in Physics at the University of Oxford under the supervision of Professor Dik Bouwmeester. She is well published and holds a patent on the "Method and apparatus for the production of entangled states of photons."

Director's Colloquium

When: Tuesday, August 25
Where: N-245 Auditorium
Time: 2:00 pm



Professor C.W. Everitt
Department of Physics
Stanford University

Testing Einstein in Space: The Gravity Probe B Detective Story

Abstract: Einstein's theory of gravity, General Relativity, advanced in 1916 remains even today the most beautiful and least tested of all the theories of physics. The NASA Gravity Probe B Mission launched in April 2004 provides two vitally important new tests by means of gyroscopes orbiting around the Earth. It has engaged a fascinating intersection of physics and engineering challenges including four years of steadily progressing data analysis so full of twists and turns that we venture to call it the Gravity Probe B Detective Story.

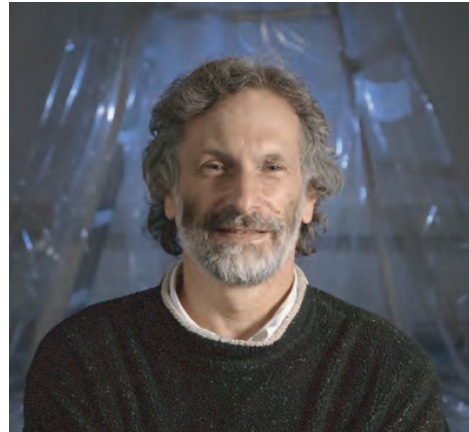
Bio: Francis Everitt has been a native Californian longer than the Governor of California. He obtained his PhD from Imperial College, London in paleomagnetism with among other things proof that in Carboniferous times, Britain was 10° south of the equator. Two years at the University of Pennsylvania then led to the discovery, with K. R. Atkins and A. Denenstein, of 3rd sound in superfluid He. At Stanford since October 1962, he has been engaged in space research, in particular the Gravity Probe B and STEP missions. He has also written extensively on the history of 19th and 20th (but not yet 21st) century physics including a biography of Maxwell and most recently an article "Kelvin, Maxwell, Einstein, and the Ether: Who was Right about What?" In 2005, he was awarded the NASA Distinguished Public Service Medal.

Director's Colloquium

When: Tuesday, January 26

Where: N-245 Auditorium

Time: 3:00 pm



Dr. Jonathan Trent
Research Scientist
NASA Ames Research Center

OMEGA and the Future of Aviation Fuels

Abstract: Offshore Membrane Enclosures for Growing Algae (OMEGA) is an innovative approach to growing oil-producing, freshwater algae in offshore enclosures, using municipal wastewater that is currently dumped into the ocean. In a typical OMEGA system, the modules float in saltwater and release forward-osmosis treated (clean) water into the surrounding saltwater. OMEGA has multiple sources of potential revenue contributing to its return on investment: 1) production of biofuels, fertilizer, and other valuable algae products, 2) wastewater processing, and 3) carbon sequestration. Dr. Trent will discuss the results of laboratory experiments and small-scale field tests, as well as some of the challenges that remain to making this a large-scale technique for producing aviation fuel.

Bio: After receiving his Ph.D. in Biological Oceanography at Scripps Institution of Oceanography studying marine microbiology, Dr. Trent spent six years in Europe studying biochemistry and molecular biology. He returned to the U.S.A. to work at the Boyer Center for Molecular Medicine at Yale Medical School for two years before establishing a biotechnology group at Argonne National Laboratory. In 1998 he moved to NASA Ames Research Center to be part of NASA's Astrobiology program. For many years, Dr. Trent has been studying the molecular adaptations of extremophiles, specifically heat shock proteins that live in extreme environments. In 2007, Dr. Trent initiated the Global Research into Energy and the Environment at NASA (GREEN) team in collaboration with Google. Currently he is serving as Principal Investigator of the OMEGA project.

DIRECTOR'S COLLOQUIUM

NASA-What's in it for Me?



February 17, 2010

1:00 P.M.

Bldg. 201 Auditorium

A reception sponsored by the NASA Ames Exchange will follow the colloquium in the lobby of Building N200.

Nichelle Nichols

Actress, Lt. Uhura of *Star Trek*

Ms. Nichols will discuss how she successfully helped NASA recruit the first women and minority astronauts for the Space Shuttle Program, for which she received NASA's Distinguished Public Service Award. Her talk will shed light on how NASA can better inspire the next generation and encourage students to pursue careers in Science, Technology, Engineering, and Mathematics (STEM). Nichelle continues as a member of the advisory board of the International Space Camp. Among her many accomplishments, Nichelle was selected in 2004 as one of the International Human Rights Consortium's Fete d'Excellence Laureates .



When Nichelle was cast by Gene Roddenberry to create Chief Communications Officer Lt. Uhura, fourth in command of the *Starship Enterprise*, in his legendary TV Series *Star Trek* – in the words of Dr. Martin Luther King – it became “The first non-stereotypical role portrayed by a black woman in television history.” Nichelle subsequently co-starred in six blockbuster *Star Trek* motion pictures. She was honored in a special exhibit at the Smithsonian's National Air and Space Museum in Washington D.C. along with her other command crew members of the *Starship Enterprise*.

Among her many notable TV and film credits, Nichelle co-starred with Cuba Gooding Jr. and

James Coburn in the Disney motion picture *Snow Dogs*, with Ron Perlman and Daniel Riordan in the TV film *Captain Zoom in Outer Space*, and with Maxwell Caulfield and LeVar Burton in the Sandy Howard film *The Supernaturals*, as well as singing and dancing with Sammy Davis, Jr. in *Porgy and Bess*. Her more recent work involves independent features including *This Bitter Earth*, *Tru Loved*, *The Torturer*, and *Lady Magdalen's*, which showcases two original compositions written by Nichelle. She most recently joined the cast of the NBC blockbuster television series *Heroes*.



Director's Colloquium

When: Wednesday, March 10

Where: N-245 Auditorium

Time: 2:00 pm



Sir Roger Penrose
Renown English
Mathematical Physicist

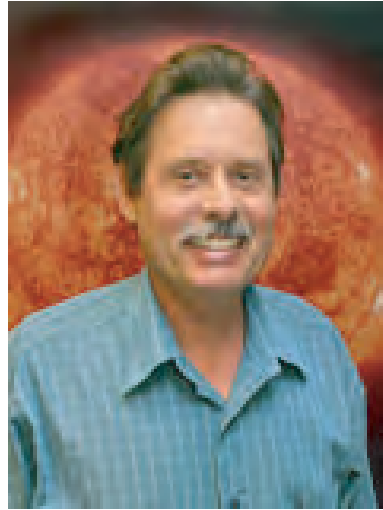
Aeons Before the Big Bang?

Abstract: The cosmic microwave background (CMB) provides much of the impressive evidence for an enormously hot and dense early stage of the universe—referred to as the Big Bang—but was this singular event actually the absolute beginning? Observations of the CMB are now very detailed, but this very detail presents new puzzles, one of the most blatant being an apparent paradox in relation to the Second Law of thermodynamics. The hypothesis of inflationary cosmology has long been argued to explain away some of these puzzles, but it does not resolve some key issues, including that raised by the Second Law. In this talk, I describe a quite different proposal, which posits a succession of universe aeons prior to our own. The expansion of the universe never reverses in this scheme, but the space-time geometry is nevertheless made consistent through a fundamental role for conformal geometry. Black-hole evaporation turns out to be central to the Second Law. Some recent analysis of CMB data, obtained from the WMAP satellite provides a tantalizing input to these issues.

Bio: English mathematical physicist and Emeritus Rouse Ball Professor of Mathematics at the Mathematical Institute, University of Oxford and Emeritus Fellow of Wadham College. He has received a number of prizes and awards, including the 1988 Wolf Prize for physics which he shared with Stephen Hawking for their contribution to our understanding of the universe. He is renowned for his work in mathematical physics, in particular his contributions to general relativity and cosmology.

Director's Colloquium

When: Tuesday, March 30
Where: N-245 Auditorium
Time: 3:00 pm



Dr. Mark Giampapa
Deputy Director
National Solar Observatory

Astrophysics with the Advanced Technology Solar Telescope

Abstract: The scientific specifications of the Advanced Technology Solar Telescope (ATST) in the areas of spectropolarimetric precision and low scattered light not only will lead to revolutionary advances in solar physics but also have the promise for innovative applications in other realms of astrophysics. These include the application of high-precision polarimetry in the investigation of circumstellar regions in young or evolved stars, the regions around active galactic nuclei, and the characterization of extrasolar planetary systems. The ATST can offer a unique platform for dedicated programs in solar-stellar physics that require long-term monitoring or large-scale surveys. Some areas of application include asteroseismology to determine the fundamental parameters in stars with significantly higher precision; the measurement of stellar convection; and, the measurement of stellar magnetic fields and their variation over short-term and decadal time scales as a critical input for the development of dynamo theory. These frontier areas and the potential role of the ATST in each will be discussed.

Bio: Dr. Mark Giampapa serves as the Deputy Director for the National Solar Observatory (NSO) with specific responsibility for the Tucson/Kitt Peak program. In this role, he has overview responsibilities for the scientific and instrument development activities at NSO/Tucson, including the Synoptic Optical Long-term Investigations of the Sun (SOLIS) project, and the conduct and support for observing programs at the NSO McMath-Pierce Telescope Facility on Kitt Peak.

Director's Colloquium

When: Wednesday, March 31

Where: N-245 Auditorium

Time: 3:00 pm



Dr. Tiago Pereira, Postdoctoral Fellow
Research School of Astronomy and Astrophysics
Australian National University in Canberra

3D Models as New Paradigm in Stellar Atmospheres: Trusting their Results and Understanding the Solar Atmosphere

Abstract: Dr. Pereira will discuss the new 3D hydrodynamic models of stellar atmospheres and how they can be used to derive reliable parameters of stars, such as chemical composition. He will discuss aspects of his PhD work where he systematically tested 3D models of the solar photosphere against several observations. He also will discuss the controversy surrounding the chemical composition of the sun itself.

Bio: Dr. Tiago M. D. Pereira is currently a post-doc at the Research School of Astronomy and Astrophysics, at the Australian National University in Canberra. His work revolves around observations and modeling, and his PhD thesis was a comparison of 3D solar model atmospheres with observations. His research interests include convection and its effects on solar and stellar abundance analysis, line formation in stellar atmospheres, chemical abundances in the Universe, and diagnostics of the solar photosphere. Other interests include thermal structure, dynamics, magnetism, supercomputing, parallel computing, 3D visualization, image processing algorithms, and efficient data reduction pipelines.

Director's Colloquium

When: Thursday, April 22
Where: N-201 Auditorium
Time: 2:00 pm



Dr. Richard Luthy
Silas H. Palmer Professor
Civil and Environmental Engineering
Stanford University

Facing Scarcity: California's Urban Water Challenges

Abstract: California cities are facing a mounting water crisis from climate change, population expansion, ecosystem demands and deteriorating infrastructure that threatens economic development, social welfare, and environmental sustainability. Without relatively large investments this crisis will only deepen through the 21st century. Accordingly, we need to advance new strategies for water/wastewater treatment and distribution that will eliminate the need for imported water, recover resources from wastewater, and generate rather than consume energy in the operation of urban water infrastructure while simultaneously enhancing urban aquatic ecosystems. This presentation will explore some of the history California's water development, discuss myths about California water that influence debates on the future of our water management, and present some solutions to our water crisis that include developments in both engineered and managed natural water systems, and advances in systems integration and institutions.

Bio: Dick Luthy's area of teaching and research is environmental engineering and water quality. His research interests include physicochemical processes and applied aquatic chemistry with application to waste reduction and treatment, and remediation of contaminated soil and sediment. Current projects address the phase partitioning, treatment, and fate of persistent hydrophobic organic compounds. He holds a Ph.D. in Civil Engineering, from the University of California, Berkeley. His impressive list of awards includes being elected to membership in the National Academy of Engineering (1999)

Director's Colloquium

When: Tuesday, May 11
Where: N-245 Auditorium
Time: 2:00 pm



Dr. Joseph Francisco
American Chemical Society President 2010
Distinguished Professor of Chemistry and Earth
and Atmospheric Sciences, Purdue University

The Joys of Chemistry and the Challenges Ahead

Abstract: This presentation provides an overview of research developments in atmospheric chemistry. The lessons learned from chemistry in Earth's atmosphere provide valuable insight into chemistry of other planets in our universe, such as Mars. The HOCO radical which is a key intermediate that has an important role in the atmospheric oxidation of CO to CO₂ will be highlighted as an example. The dynamics and kinetics of the reactions of the HOCO radical with a variety of collision partners as studied by ab initio and molecular dynamics methods will be presented. More importantly, the impact of HOCO chemistry in Earth and Mars environments will be discussed. This presentation will also provide an overview of issues impacting the chemical enterprise, our competitiveness in the global marketplace, and how the American Chemical Society can play a leadership role in moving the chemical enterprise forward into the future.

Bio: Dr. Joseph Francisco is the 2010 President of the American Chemical Society and the William E. Moore Distinguished Professor of Chemistry and Earth and Atmospheric Sciences at Purdue University. Research in his laboratory focuses on basic studies in spectroscopy, kinetics and photochemistry of novel transient species in the gas phase. These species play an important role in atmospheric, biochemical and combustion processes. Theoretical and experimental methods are used cooperatively in extending spectroscopic information on these species. His degrees include a Ph.D. from Massachusetts Institute of Technology (1983) and an Honorary Doctor of Science degree from Tuskegee University (2010).

Director's Colloquium



Dr. Felisa Wolfe-Simon
NASA Astrobiology Research Fellow
U.S. Geological Survey in Menlo Park

When: Wednesday, February 9
Where: N-201 Auditorium
Time: 2:00 pm



Microbes and the four basic strategies for life on Earth

Abstract: Life on Earth is metabolically diverse and yet maintains a biochemical unity. That is, all known biology is composed of essentially identical components such as DNA/RNA, proteins and lipids made of carbon, hydrogen, nitrogen, oxygen, sulfur and phosphorus; while the physiology of organisms can be highly varied. The basis for all life starts with chemical underpinnings. This chemical potential manifests in four metabolic strategies used by life on Earth today, all of which most likely evolved in the distant past. In addition to well-known microbes with unexpected metabolism, current research is also addressing this “unity of biochemistry” to identify potential alternatives to “CHNOSP”-based life. Similar to individual cambialistic metalloproteins, maybe microbes could take advantage of similarities between the light elements and their periodic table neighbors. For example, could there be some level of biochemical substitution for arsenic in place of phosphorus?

Bio: Felisa Wolfe-Simon is currently a NASA Astrobiology Research Fellow in residence at the U.S. Geological Survey in Menlo Park, California. Dr. Wolfe-Simon’s research seeks to address geologically informed hypotheses to unravel the biogeochemical co-evolution of life and Earth. Specifically, her work has addressed the evolution of metal-based enzymes and their role in globally relevant processes like photosynthesis. Building on these ideas, she has developed an interest in using “what-we-do-know” about biological processes to help uncover what “we-don’t-know” and promote approaches to search for and think about alternative biochemistries on Earth. She obtained her dual undergraduate degrees in Biology (B.A.) and Music Performance (B.M.) at Oberlin College and Conservatory of Music and went on to earn her Ph.D. in Oceanography at Rutgers University.

Director's Colloquium

When: Wednesday, February 23
Where: N-201 Auditorium
Time: 2:00 pm



William J. Borucki
Kepler Science Principal Investigator
NASA, Ames Research Center

Recent Results from the Kepler Mission Search for Other Earths

Abstract: Is our Milky Way galaxy home to other planets the size of Earth? The Kepler Mission has released its latest findings from the analysis of the first four months of observations. The findings increase the number of planet candidates identified by Kepler to-date to 1,235. Of these, 68 are approximately Earth-size; 288 are super-Earth-size; 663 are Neptune-size; 165 are the size of Jupiter and 19 are larger than Jupiter. Of the 54 new planet candidates found in the habitable zone, five are near Earth-sized. The remaining 49 habitable zone candidates range from super-Earth size -- up to twice the size of Earth -- to larger than Jupiter. Among the stars with planetary candidates, 170 show evidence of multiple planetary candidates, including one, Kepler-11, that scientists have been able to confirm that it has no fewer than six planets

Bio: William Borucki is a space scientist at the NASA's Ames Research Center, Moffett Field, Calif. He received a master's degree in physics from the University of Wisconsin, Madison in 1962 and then moved to Silicon Valley where he first worked on the development of the heat shield for the Apollo Mission in the Hypersonic Free Flight Branch at NASA Ames. After the successful moon landings, he transferred to the Theoretical Studies Branch where he investigated lightning activity in planetary atmospheres and developed mathematical models to predict the effects of nitric oxides and chlorofluoromethanes on Earth's ozone layer. Currently he is the Science Principal Investigator for the Kepler Mission that uses transit photometry to observe over 100,000 stars and is designed to determine the frequency of terrestrial planets orbiting in and near the habitable zones of other stars. Kepler launched on March 6, 2009, and is now in the science operations phase.

Director's Colloquium

When: Tuesday, March 15
Where: N-245 Auditorium
Time: 3:00 pm



Professor Drew Endy
Stanford University

Past Performance is No Guarantee -- The Future of Synthetic Biology

Abstract: Professor Endy will discuss the synthetic biology research in his laboratory at Stanford, especially as it applies to enabling the engineering of genetically encoded memory systems. Modest amounts of programmable memory, if implemented within living organisms, would have profound impacts on the study and treatment of diseases and would broadly enable non-medical applications of biotechnology. Dr. Endy's laboratory is interested in both the basic science of how to best store information inside cells to practical applications of the technology. Dr. Endy's work in the area of synthetic biology has the overall long-term goal to help make biology easy to engineer.

Bio: Drew Endy is an Assistant Professor of Bioengineering at Stanford. He earned a BS and MS in Civil and Environmental Engineering, respectively, from Lehigh University and a PhD in Biochemical Engineering from Dartmouth College. Drew joined the Stanford faculty in late 2008, having previously studied with and served on the Biological Engineering faculty at MIT. Current student-led projects in his laboratory include the design and implementation of scaleable genetically encoded information storage systems, and also genetically encoded cell-cell communication systems in which the channel and message can be decoupled so as to support the transmission of many messages via a common channel. Dr. Endy is the founding director of the public benefit BIOFAB facility in Emeryville CA, which is developing "expression operating systems" enabling organismal engineering at the genome scale, and the founding president of the public benefit BioBricks Foundation, which develops and supports legal frameworks and open technical standards that enable genetic engineering.

Director's Colloquium

When: Thursday, July 7th
Where: N-245 Auditorium
Time: 2:00 pm



Professor Daniel Lidar
Professor of Electrical Engineering and Chemistry
University of Southern California,

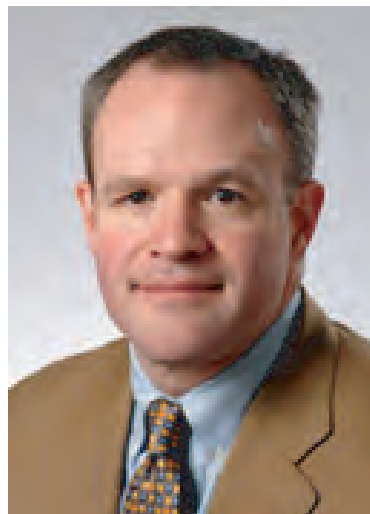
Quantum computation: advantages, problems, and solutions. Or, why would I want to own a quantum computer?

Abstract: Quantum computation has the potential to become a major game changing technology with applications in cryptography, data processing, and machine learning, to name a few. In some cases quantum algorithms exist which are provably superior to their classical counterparts, and in many other cases quantum algorithms are strongly suspected to offer exponential speedups, while formal proofs are not yet available. In all cases this promise awaits a hardware realization, and is compromised by the problem of decoherence, or noise. This talk will survey some of the breakthroughs in quantum algorithms, with an emphasis on the adiabatic model of quantum computation and methods for overcoming the problem of decoherence. Potential applications of interest to NASA will be highlighted.

Bio: Daniel Lidar is a professor of Electrical Engineering and Chemistry at the University of Southern California, and holds a cross-appointment in Physics. He obtained his Ph.D. in Physics from the Hebrew University of Jerusalem in 1997. He was a postdoc at UC Berkeley from 1997 to 2000, then on the Chemistry department faculty at the University of Toronto from 2000 to 2005, with cross-appointments in Mathematics and Physics. His research interests lie primarily in the theory and control of open quantum systems, with a special emphasis on quantum information processing. His past interests include scattering theory and disordered systems.

Director's Colloquium

When: Tuesday, July 12th
Where: N-201 Auditorium
Time: 11:00 am



Professor Jay Keasling, UC Berkeley
Director of Physical Biosciences Division, LBL
CEO, Joint BioEnergy Institute

Synthetic Biology for Synthetic Chemistry

Abstract: Synthetic biology is the design and construction of new biological entities such as enzymes, genetic circuits, and cells or the redesign of existing biological systems. Synthetic biology builds on the advances in molecular, cell, and systems biology and seeks to transform biology in the same way that synthesis transformed chemistry and integrated circuit design transformed computing. The element that distinguishes synthetic biology from traditional molecular and cellular biology is the focus on the design and construction of core components (parts of enzymes, genetic circuits, metabolic pathways, etc.) that can be modeled, understood, and tuned to meet specific performance criteria, and the assembly of these smaller parts and devices into larger integrated systems that solve specific problems. He will discuss the work in his laboratory to use synthetic biology to create an inexpensive, effective, anti-malarial drug, and to use microorganisms to produce advanced biofuels.

Bio: Jay Keasling received his MS and Ph. D. degrees in Chemical Engineering from the University of Michigan. He joined the Department of Chemical Engineering at the University of California, Berkeley as an assistant professor in 1992, where he is currently the Hubbard Howe Distinguished Professor of Biochemical Engineering. Dr. Keasling is also a professor in the Department of Bioengineering at Berkeley, a Senior Faculty Scientist and Acting Deputy Director of the Lawrence Berkeley National Laboratory and Chief Executive Officer of the Joint BioEnergy Institute. He is considered one of the foremost authorities in synthetic biology, especially in the field of metabolic engineering, and his research focuses on engineering microorganisms for environmentally friendly synthesis of small molecules or degradation of environmental contaminants.

Director's Colloquium

When: Thursday, July 14th
Where: N-201 Auditorium
Time: 11:00 am



Astronaut Steve Hawley

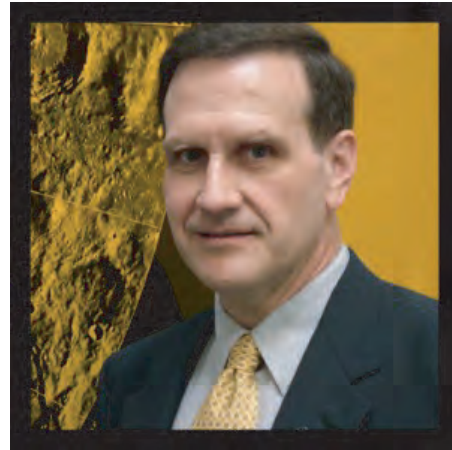
My Life With the Hubble Space Telescope

Abstract: The Hubble Space Telescope (HST) is arguably the single most visible thing that NASA has done since the lunar landings. The drama of astronauts working to repair or upgrade HST captured the interest of the general public, and the spectacular scientific results from HST have revolutionized our understanding of the Universe in ways that were even beyond the dreams of Hubble team when HST was launched in 1990. He will discuss the original concepts behind the maintenance and operations of the Hubble Space Telescope, as well as the challenges and achievements that were key to keeping HST a state-of-art-observatory for 21 years in orbit. He will share some behind-the-scenes stories about preparing for and working on HST in orbit, and will share pictures that were taken on the missions as well as some of the more famous scientific images that Hubble has taken

Bio: Dr. Steve Hawley received a doctor of philosophy in astronomy and astrophysics from the University of California, Santa Cruz in 1977. Dr. Hawley was selected as a NASA astronaut in January 1978. He is a veteran of five space flights (STS-41D in 1984, STS-61C in 1986, STS-31 in 1990, STS-82 in 1997 and STS-93 in 1999). Three of his missions involved NASA's Great Observatories. Dr. Hawley has logged more than 32 days in space. He retired from NASA and returned to the University of Kansas in 2008 where he is a professor of physics and astronomy and Director of the Engineering Physics program. Dr. Hawley's research interests include spectrophotometry of nebulae and active or star-forming galaxies as well as the problems of human spaceflight. Dr. Hawley is a member of the American Astronomical Society, the Astronomical Society of the Pacific, the American Institute of Aeronautics and Astronautics, and the Association of Space Explorers.

Director's Colloquium

When: Tuesday, October 18th
Where: N-201 Auditorium
Time: 2:00 pm



Dr. Paul Spudis, Senior Staff Scientist
Planetary Institute in Houston, Texas

A Rationale for Cislunar Space

Abstract: The International Space Station proves that human- and machine-assembled satellites can be as big and as capable as needed, unlimited by launch vehicle size. But we cannot routinely access orbits beyond LEO with people and machines to build and maintain such satellites today. A system based around the manufacture and use of propellant made from lunar materials can reduce the cost for new space activities, enable routine access to and from the surface of the Moon, access all other points in cislunar space, including GEO and other orbits useful for space assets; and enable human interplanetary flight (i.e., to Mars and beyond). Both robotic and human presence is required on the Moon to enable and maintain production from lunar resources. By going to the Moon to establish a permanent presence, we create a reusable, extensible and maintainable (thus, affordable) transportation system, a “transcontinental railroad” for cislunar space while expanding human reach beyond LEO.

Bio: Paul D. Spudis is a Senior Staff Scientist at the Lunar and Planetary Institute in Houston, Texas. He is a geologist specializing in study of the histories of and processes on the rocky planets of the Solar System. His current research emphasis is on the deposits and environment of the poles of the Moon with the aim of understanding their potential as sites for future human exploration and use. He was educated at Arizona State University (B.S. 1976; Ph.D. 1982) and Brown University (Sc.M. 1977). He has been awarded the NASA Distinguished Service Medal, the Theodore von Karman medal from the American Institute of Aeronautics and Astronautics, and the Space Pioneer award of the National Space Society. He is the author of more than 100 scientific papers, five books, and numerous articles for the popular press.

Director's Colloquium

When: Wednesday, October 19th
Where: N-245 Auditorium
Time: 3:00 pm



Dr. David Des Marais, senior space scientist
NASA Ames Research Center

The landing site search for the Mars Science Laboratory mission has led to Gale Crater

Abstract: The Mars Science Laboratory (MSL) rover will investigate a landing site to determine whether it ever hosted an environment capable of supporting microbial life. All four of the final candidates were safe for landing and trafficability and were also scientifically compelling. Gale crater prevailed because it hosts an accessible 5 km thick mound of layered sediments that contain diverse hydrous minerals, such as sulfates and phyllosilicates. This rock sequence was deposited over an extended time period in diverse potentially habitable aqueous environments.

Bio: Dr. David Des Marais is a senior space scientist at NASA Ames Research Center. He has investigated the geochemistry of lunar samples, meteorites and both volcanic and ancient sedimentary rocks from Earth. He coordinated a long-term study of benthic cyanobacterial ecosystems. David is Principal Investigator of the Ames Research Center Team of the NASA Astrobiology Institute. He is currently a member of the science teams of NASA's 2003 Mars Exploration Rover mission, the 2005 Mars Reconnaissance Orbiter mission, the 2011 Mars Science Laboratory mission and the 2016 ExoMars/Trace Gas Orbiter mission. He has published more than 160 technical articles and chapters on these topics. David is Chair of NASA's Mars Exploration Program Analysis Group. He is a Fellow of the Geochemical Society, the European Association of Geochemistry, the International Society for the Study of the Origins of Life, the California Academy of Sciences, the American Geophysical Union, and the American Academy of Microbiology.

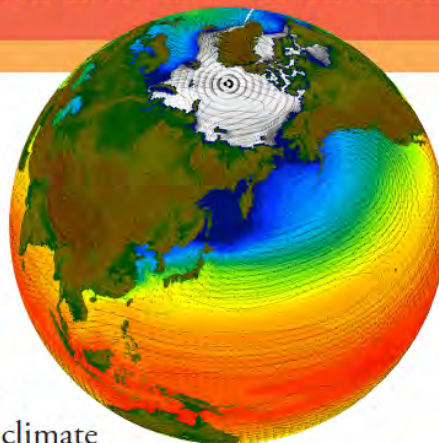
DIRECTOR'S COLLOQUIUM

20th and 21st Century Climate Change: Climate Modeling, Societal Impacts, and Environmental Justice

When: **Thursday, December 8th**

Where: **N-258 Auditorium**

Time: **2:00 pm**



Abstract: The most recent Intergovernmental Panel on Climate Change Assessment Report has convinced most climate scientists that humankind is changing the earth's climate and that significant global warming is taking place. Some scientists are skeptical of the IPCC view and think the observed changes result from natural climate variability or other causes. A brief review of recently observed 20th century climate change will be presented and compared with climate model simulations. Computer simulations and animations of climate and future climate change will be shown from low and high carbon emission scenarios. Finally, at the end there will be a discussion of the scientific uncertainties and societal impacts along with an analysis of policy options including possible geoengineering of the climate system. The issue of environmental justice will also be discussed.



Dr. Warren Washington
Senior Scientist
National Center for
Atmospheric Research

Bio: Warren M. Washington is a senior scientist and former head of the Climate Change Research Section in the Climate and Global Dynamics Division at the National Center for Atmospheric Research (NCAR). He has published more than 150 papers in professional journals and co-authored a book entitled, "An Introduction to Three-Dimensional Climate Modeling." He is a member of the National Academy of Engineering, American Philosophical Society, and the American Academy of Arts and Sciences. He has received many awards, including the Le Verrier Medal of the Societe Meteorologique de France, the National Weather Service Modernization Award, and the AMS Dr. Charles Anderson Award. On November 17, 2010 he was awarded the National Medal of Science by President Obama, which is the nation's highest science award.

Director's Colloquium

When: Wednesday, February 8
Where: N-201 Auditorium
Time: 2:00 pm



Dr. Richard Linnehan
United States Astronaut

Future NASA biomedical applications and countermeasures for long duration human spaceflight and exploration

Abstract: Astronaut Richard Linnehan will discuss operational research in aerospace and biomedical performance-enhancing countermeasures associated with human spaceflight and exploration as well as non-exploration-related space biological research. He also will discuss novel ways to leverage ARC research and expertise in developing novel K-12 STEM curricula focusing on the importance of space-related biological technologies in U.S. education, industry and NASA's strategic vision for the future.

Bio: Astronaut Rick Linnehan, B.S., D.V.M., MPA, is currently assigned to a NASA Interagency Personnel Agreement (IPA) fostering broad research partnerships with academia and private sector organizations with the goal of reinvigorating space-related biological research critical to NASA and ARC's current and future missions. A veteran of four Space Shuttle missions, and a veterinarian trained in comparative pathophysiology, Dr. Linnehan has flown aboard Columbia on two Space Lab life sciences missions and to the Hubble Space Telescope. His last mission, flown aboard Endeavour, delivered the first element of the Japanese KIBO assembly –the JEM – and the Canadian robot "DEXTRE" and was one of the last EVA-intensive ISS construction missions.

Director's Colloquium

When: Thursday, February 23
Where: N-201 Auditorium
Time: 2:00 pm



(c) F&E Schmidt

Dr. Joan Vernikos

Former Director of NASA's Life Sciences
Program, author and consultant

Sitting Kills, Moving Heals ~ Secrets from Space for Long and Healthy Living on Earth

Abstract: The way we live is slowly killing us, and yet we can't seem to stop it. We have struggled for decades to exercise more and eat less, but we're fatter, sicker and more tired than ever before. Amazingly the answers to this conundrum came from a most unlikely source -- space. Years of research in NASA, much of it here at Ames, led to the discovery that our modern sedentary lifestyle produces a wide variety of spaceflight-like changes. It revealed the unsuspected medical connection between the health dangers of living without gravity in space, and the chronic diseases caused by sedentary lifestyles here on Earth. Dr. Vernikos presents her discovery in detail, in her new book *Sitting Kills, Moving Heals* and will share with us some of her easy-to-follow methods of incorporating "G-Effective Activity" into everyday life to improve health, increase fitness, and even delay the effects of aging.

Bio: Joan Vernikos, former Director of NASA's Life Sciences, is author, consultant and sought-after motivational speaker on the tangible health and economic benefits of healthy living and aging. Her pioneering research at Ames, established the Center's leadership as the premier Human ground Research Facility for NASA. A pharmacologist from the University of London, her research, and publications on the management of stress, and how spaceflight and earth's gravity affect men and women have been recognized with numerous awards. She holds three patents including one for the Human Powered Centrifuge. A member of the International Academy of Astronautics, she served on the Space Studies Board of the National Academy of Sciences. Her latest book, is entitled *"Sitting Kills, Moving Heals: How Simple Everyday Movement Will Prevent Pain, Illness, and Early Death – and Exercise Alone Won't (2011)."*

Director's Colloquium

When: Thursday, March 8
Where: N-245 Auditorium
Time: 3:00 pm



Professor Jack Burns
University of Colorado, Boulder
NASA Lunar Science Institute

The Dark Ages Radio Explorer (DARE)

Abstract: A concept for a new space-based cosmology mission called the Dark Ages Radio Explorer (DARE) will be presented in this talk. DARE's science objectives include (1) When did the first stars form? (2) When did the first accreting black holes form? (3) When did Reionization begin? (4) What surprises does the end of the Dark Ages hold (e.g., Dark Matter decay)? DARE will use the highly-redshifted hyperfine 21-cm transition from neutral hydrogen to track the formation of the first luminous objects by their impact on the intergalactic medium during the end of the Dark Ages and during Cosmic Dawn (redshifts $z=11-35$). It will measure the sky-averaged spin temperature of neutral hydrogen at the unexplored epoch 80-420 million years after the Big Bang, providing the first evidence of the earliest stars and galaxies to illuminate the cosmos and testing our models of galaxy formation.

Bio: Dr. Jack Burns is a Professor in the Department of Astrophysical and Planetary Sciences and Vice President Emeritus for Academic Affairs and Research for the University of Colorado Boulder. He is also Director of the NASA Lunar Science Institute's Lunar University Network for Astrophysics Research (LUNAR), a NASA-funded center. Burns received his B.S. degree, magna cum laude, in Astrophysics from the University of Massachusetts. He was awarded a Ph.D. in Astronomy from Indiana University. Dr. Burns has 370 publications in refereed journals, books, and in conference proceedings and abstracts (as listed in NASA's Astrophysics Data System). Burns is an elected Fellow of the American Physical Society and the American Association for the Advancement of Science. He received NASA's Exceptional Public Service Medal in 2010 for his service on the NASA Advisory Council (NAC) and as Chair of the NAC Science Committee.

Director's Colloquium

When: Wednesday, April 18th
Where: N-245 Auditorium
Time: 10:00 am



Colonel M.V. "Coyote" Smith, PhD
Director of the US Air Force Center
for Strategy and Technology

Shift Happens: Security in The Age of Surprise

Abstract: Colonel Smith will discuss revolutionary emerging technologies with prefixes such as nano-, bio-, cyber-, nuc-, climate-, astro-, proto-, and hyper-. He considers himself to be neither a scientist nor an engineer, but instead a strategist and future scientist. Most of his time is spent interpreting the implications of new and emerging technologies and their social, political, security, and ethical concerns. He will provide his view of what the future holds in the 2035 and 2050 time frame.

Bio: Colonel M.V. "Coyote" Smith, PhD, is the Director of the US Air Force Center for Strategy and Technology (Project Blue Horizons) at Maxwell Air Force base, AL, where he also serves as a Professor of Strategic Space Studies at the School of Advanced Air and Space Studies. He is also an associate director of the Eisenhower Center for Space and Defense Studies at the US Air Force Academy. Before completing his PhD at the University of Reading in the UK, the Colonel served as the Chief of "Dream Works," which was the Future Concepts shop in the Pentagon's National Security Space Office. Dream Works developed, explored, advocated, and linked future concepts, capabilities, and promising technologies to advance the art of spacefaring across the security and civil sectors. He was the director of the Space-Based Solar Power Study, for which he and his team received the Space Pioneer Award for 2008. He is the Chief Futurist of the Air Force. His passion is to advance the interests of nation-states through normal, competitive, government exploration and subsequent commercial development of space.

Director's Colloquium

When: Thursday, May 31st
Where: N-201 Auditorium
Time: 10:00 am



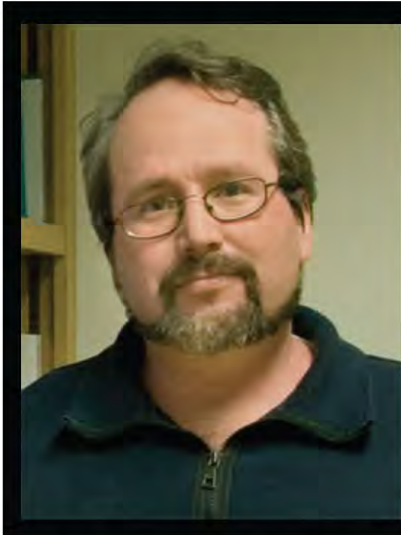
Dr. Charles (Charlie) Pellerin
Author of "How NASA Builds Teams"

The "Fifth-Force"

Abstract: Scientists and engineers spend many years learning how to experiment and design within the constraints of Mother Nature's four forces. These forces are the strong force (nuclear), the weak force (radioactivity), the electromagnetic force, and the gravitational force. Successful project managers and effective team leaders understand that while it is necessary to address Mother Nature's forces, it is not sufficient. These people know that they must measure and manage the "fifth-force" that governs human behavior. This force is "team social context." How can I be so sure about the connection between team social context and success? I learned the hard way, leading the team that built Hubble Space Telescope for nearly a decade, ignoring the fifth force, then discovering that I was responsible for arguably the biggest screw-up in the history of science. Hubble's Failure Review named the failure, a "Leadership Failure." I will show you how easy it is to manage the "fifth-force," quantitatively boosting your team performance. The processes have refined with the experiences of the 1,000+ NASA teams who all chose to voluntarily use "4-D" processes.

Bio: Dr. Pellerin holds a PhD in Astrophysics, and an MBA from Harvard Business School's "Program for Management Development". As NASA Director of Astrophysics, he led a multi-billion dollar program for a decade, launching 12 satellites. Charlie invented the Great Observatories program which garnered over \$8B for space astrophysics. Charlie then developed NASA's post-cold-war strategy, for which NASA awarded him the Distinguished Service Medal. In 1993, he joined the University of Colorado's Business School as a professor of Leadership. He taught undergraduates, MBAs, and executives. His recent book "How NASA Builds Teams" has Amazon's highest rating. His 4-D process is widely used throughout the world.

Director's colloquium



Synthetic Biology:

An engineering approach to designing complex functions in living cells.

Adam Arkin, UC Berkeley, LBNL

Mon July 16th 3-4 pm, N201

Light refreshments will be served in the Bld-200 lobby afterwards

Abstract: *To meet the goal of creating reliable, predictable, efficient, and transparent methods to harness cellular capabilities for human benefit, it is necessary both to have standard libraries of elements from which useful pathways can be constructed and an understanding of the how host physiology and the environment impacts the functioning of these heterologous circuits. We show how variations in cellular and environmental context affect the operation of the basic central dogma functions underlying gene expression. Then we describe progress on creating a complete, scalable, and relatively homogeneous and designable sets of part families that can control central dogma function predictably in the face of varying configurations, genetic contexts, and environments. We show the challenges that arise in attempting this in applications such as a cancer tumor destroying bacteria.*

Bio: *Dr. Arkin is the Director of Physical Biosciences Division at Lawrence Berkeley National Laboratory, Dean A. Richard Newton Memorial Professor, Dept of Bioengineering, University of California, Berkeley, Division Director of the Physical Biosciences Division at the Lawrence Berkeley National Laboratory and a Full Professor in the Department of Bioengineering, U.C. Berkeley. He is Director of the Synthetic Biology Institute launched this year at Berkeley and Co-Director of the BIOFAB: International Open Facility Advancing Biotechnology (BIOFAB). In addition, he directs the Joint Bioenergy Institute's Bioinformatics Group and Berkeley Lab's Virtual Institute of Microbial Stress. He also was an investigator with the Howard Hughes Medical Institute (HHMI) until 2007. Prof. Arkin has served on many academic and government committees including the US Air Force Science Advisory Board and the Defense Science Study Group.*

Join the syn bio mailing list: Ames_space_bio_talks_Seminars@lists.nasa.gov

Director's Colloquium

When: Thursday, July 26
Where: N-201 Auditorium
Time: 2:00 pm



Paul Saffo is a Technology Forecaster and Consulting Professor in the School of Engineering at Stanford

Cyberspace, social media and the great turbulence: implications for global institutions

Abstract: The 2008 crash was more than a downturn; it marked the end of the "Great Moderation" a two decade period of mild business cycles and steady growth. Now many fear we are headed towards a prolonged recession (or worse), while a small minority predict a new boom just around the corner. Both groups miss the point, for we have entered a new era defined not by boom or bust, but by a new kind of volatility that will be with us for at least a decade. The global economy has entered the "Great Turbulence," a decade-scale new order that will be characterized by high amplitudes, short cycles and scarce equilibrium. This shift will transform politics and policy globally, threaten incumbents and create particular challenges for institutions with long-term public missions. But amidst the challenges are also important opportunities for institutions that adapt themselves to the turbulent new order.

Bio: Paul Saffo is a forecaster with over two decades experience helping corporate and governmental clients understand and respond to the dynamics of large-scale, long-term change. He is Managing Director of Foresight at Discern Analytics and teaches at Stanford where he is a Consulting Associate Professor in the Engineering School. Paul is also a non-resident Senior Fellow at the Atlantic Council, and a Fellow of the Royal Swedish Academy of Engineering Sciences. Paul is also Chair of the Futures & Forecasting Track at Singularity University. His essays have appeared in a wide range of publications including The Harvard Business Review, Foreign Policy, Fortune, Wired, The Los Angeles Times, Newsweek, The New York Times and the Washington Post. Paul holds degrees from Harvard College, Cambridge University, and Stanford University.

Director's Colloquium

When: Tuesday, December 11
Where: N-201 Auditorium
Time: 1:30 pm



Ravi Prakash (left) and Bobak Ferdowsi (right)
JPL Entry and Landing Systems Engineers

Curiosity: The Boldest Mission to Mars Ever

Abstract: The Mars Science Laboratory team at JPL dared mighty things by landing Curiosity on Mars on August 6th. Curiosity continues to spark the imagination as it explores the Martian surface. Join Ravi Prakash and Bobak Ferdowsi ("Mohawk Guy") as they take you through the events that led to Curiosity's extraordinary landing, and find out what the rover has been doing ever since. Highlights include the role Ames played in Curiosity's success.

Ravi joined JPL in 2005 as an Entry Descent and Landing Systems engineer. Ravi became a member of the MSL EDL team in 2007 where he helped design field tests for the radar and was the systems engineer for the heatshield instrumentation suite called MEDLI (which was designed in part at Ames). Ravi is currently helping with the MSL EDL reconstruction effort and is already designing a future Mars lander. Ravi has a Bachelor of Science in Aerospace Engineering from The University of Texas at Austin, and a Master of Science in Aerospace Engineering from the Georgia Institute of Technology.

Bobak Ferdowsi is a Flight Director and member of the Engineering Operations Team on the Mars Science Laboratory (MSL) Curiosity Project at JPL. He earned his Bachelor of Science degree in Aeronautics and Astronautics in 2001 from the University of Washington and subsequently his Master of Science in the same area from Massachusetts Institute of Technology. Bobak has always wanted to work on missions to Mars. He plays shortstop in the Jet Propulsion Laboratory softball league and usually rides his bike to work.

**Ames Director's Colloquium
Summer Series Posters 2007-2012**



Ames Director's Colloquium Summer Series

(N245 Auditorium- second floor*)

june

Thursday, **June 14th - 3:00 pm**

Bill Warmbrodt "Aeromechanics Rotorcraft Research in the National Full-Scale Aerodynamics Complex"

Thursday, **June 21st - 3:00 pm**

Ashok Srivastava "Recent Advances in Data Mining"

Tuesday, **June 26 - 2:00 pm**

Chris Potter "Studying Global Warming's Impacts and the Uncertain Future of the Biosphere"

Tuesday, **July 10th - 2:00 pm**

David Morrison "Impacts and Evolution"

july

Tuesday, **July 17th - 2:00 pm**

Pete Klupar "Small Spacecraft, What's the Big Deal?"

Tuesday, **July 24 - 2:00 pm**

Banavar Sridhar "Modeling and Optimization of Air Traffic Flows"

Tuesday, **July 31 - 2:00 pm**

Jack Lissaur "Extrasolar Planets"

aug.

Tuesday, **August 7th- 2:00 pm**

Scott Sandford "The Stardust Discovery Mission Returns a Sample from a Comet"

Tuesday, **August 14th- 2:00 pm**

Chris McKay "Titan: rain, storms, lakes, and organic goo"

Tuesday, **August 21st- 2:00 pm**

Nathalie Cabrol "The High Lakes Project"

director's colloquium

*The first two talks are on Thursday at 3:00pm, the last eight talks are on Tuesday at 2:00pm. Note that there is no colloquium on July 3rd. All colloquia last 60 minutes including questions. A 30 minute reception with punch and cookies follows to allow networking and additional questions.



Ames Director's Colloquium 2008 Summer Series

All talks will be from **2:00-3:00 pm** in the **Main Auditorium (N201)**
Reception following in the lobby of N200

june

Tuesday, June 10

Jack Boyd

"Reflections on NASA's 50th Anniversary:
The Giants on Whose Shoulders We Stood"

Tuesday, June 17

Jennifer Heldman

"Prospecting for Water Ice on the Moon: NASA's Lunar Crater
Observation and Sensing Satellite (LCROSS) Mission"

Tuesday, June 24

Jonathan Trent

"Global Research into Energy and the Environment at NASA
(GREEN)"

Tuesday, July 8

Lynn Rothschild

"Life in Extreme Environments"

july

Tuesday, July 15

Louis Allamandola

"From Infrared Astrophysics to Astrobiology"

Tuesday, July 22

James Arnold

"Synopsis of Ames Contributions to Entry Technology --
A Historical Perspective"

Tuesday, July 29

David Des Marais

"Exploring for Evidence of Habitable Environments and
Life on Early Earth and on Mars"

aug.

Tuesday, August 5

Pete Worden

"Protecting Earth from Asteroids"

Tuesday, August 12

Chris McKay

"Missions to Investigate the Polar Ice of Mars:
Phoenix and Beyond"

Tuesday, August 19

Seth Shostak

"Science Searches for ET"

director's colloquium



Ames Director's Colloquium 2009 Summer Series

All talks will be from **2:00 - 3:00 pm** in the **Main Auditorium (N201)**
Reception following in the lobby of N200

june

Tuesday, June 9

Bill Borucki "Kepler: A Step Toward Discovering Life in the MilkyWay"

Tuesday, June 16

Dale Cruikshank "Cassini Explores the Saturn System"

Tuesday, June 23

Philip Russell "Aerosol Particle Roles in Climate Change"

Tuesday, June 30

Pete Worden "Protecting Earth from Asteroids"

july

Tuesday, July 7

Dov Adelstein "Human Vibration Studies for NASA's Constellation Program"

Tuesday, July 14

Pamela Marcum "How SOFIA Will Help Shape the Future of Infrared Astronomy"

Tuesday, July 21

Lynn Harper "Unleashing the Genius: Commercial Passenger Spaceflight"

Tuesday, July 28

Liane Guild "NASA's Airborne Remote Sensing of Coral Reefs"

aug.

Tuesday, August 4

Carl Pilcher "Astrobiology and Virtual Institutes"

Tuesday, August 11

Laura Iraci "Laboratory and GCM Studies of Cloud Formation on Mars"

director's colloquium



Ames Director's Colloquium 2010 Summer Series

All talks will be from **2:00-3:00 pm** in the **Main Auditorium (N201)**
Reception following in the lobby of N200

june

Tuesday, June 8
Darlene Lim Pavilion Lake Research Project: Using Underwater Field Science to Prepare Humans for Future Planetary Exploration

Tuesday, June 15
Anthony Colaprete Water on the Moon, Latest Results from LCROSS

Tuesday, June 22
Kai Goebel When will it Break? Prognostics and Health Management for Aeronautics and Space Systems

Tuesday, June 29
Natalie Batalha Catching Shadows: Kepler's Search for New Worlds

july

Tuesday, July 6
Ramakrishna Nemani Earth Science Collaborative for Ecological Forecasting

Tuesday, July 13
Pete Worden Protecting the Earth from Asteroids

Tuesday, July 20
Laura Kushner Experimentation in Aerodynamics

Tuesday, July 27
Tori Hoehler A 'Follow the Energy' Approach in Astrobiology

aug.

Tuesday, August 3
Andrew Watson Vision Science and Visual Technology

Tuesday, August 10
Stuart Rogers Aerodynamics and Debris Transport for the Space Shuttle Launch Vehicle

director's colloquium

All colloquia last 60 minutes including questions. A 30 minute reception with punch and cookies follows to allow networking and additional questions.



Ames Director's Colloquium 2011 Summer Series

All talks will be from **2:00-3:00 pm** in the **Main Auditorium (N201)**
Reception following in the lobby of N200

June

Tuesday, June 7
Matt Small* Overview of Science at the Environmental Protection Agency (EPA) and a Presentation of Ground Water Cleanup Research

Tuesday, June 14
Kevin Zahnle Dune: The Other Habitable Planet

Tuesday, June 21
Jack Lissauer Kepler's Multi-Planet Systems

Tuesday, June 28
Sandra Lozito Air-Ground Communications in the Future Air Traffic Management System

July

Tuesday, July 5
S. Pete Worden Protecting the Earth from Asteroids

Tuesday, July 12
Mary Kaiser Smoothing the Bumps: Human-Systems Integration Research at NASA

Tuesday, July 19
Katherine Hoag* Using Science Research, Tools and Approaches in Air Quality Management Decision-making

Tuesday, July 26
Leslie Bebout Microbial Systems: Nexus roles for Astrobiology, Energy and Space

aug.

Tuesday, August 2
Natalie Batalha Honing in on eta-Earth: Kepler's Hunt for Habitable Planets

Tuesday, August 9
Chris McKay Perchlorate and Organics in Mid-Latitudes on Mars and Implications for the Search for Life

director's colloquium

*Guest speaker from the Environmental Protection Agency

All colloquia last 60 minutes including questions. A 30 minute reception with punch and cookies follows to allow networking and additional questions.



Ames Director's Colloquium 2012 Summer Series

All talks will be from **2:00-3:00 pm** in the **Main Auditorium (N201)**
Reception following in the lobby of N200

june

Tuesday, June 12

David Morrison Danger from the Sky: Real and Imagined

Tuesday, June 19

Karen Bradford Being NASA – Where do I fit on the Meatball?

Tuesday, June 26

William Warmbrodt Rotorcraft Research at NASA Ames Research

Tuesday, July 3

Chris McKay Antarctica: Cold and Dry Like Mars - But a Lot Closer

Tuesday, July 10

Natalie Batalha The Road to ExoEarth: Latest Results from NASA's Kepler Mission

july

Thursday, July 12

Pete Worden The Search for Life in the Universe and our Future

Tuesday, July 17

Pam Marcum A Year of SOFIA Science

Tuesday, July 24

David Blake Development and Deployment of the ChemMin Mineralogy Instrument on the Mars Science Laboratory

Tuesday, July 31

Lynn Rothschild From Astrobiology to Star Trek: Synthetic biology and NASA's Missions

aug.

Tuesday, August 7

Chris Potter Chapters from the "User's Manual for Research on Climate Change Impacts"

director's colloquium

All colloquia last 60 minutes including questions. A 30 minute reception with punch and cookies follows to allow networking and additional questions.