

# ***Fundamental physics changes in response to evolving NASA needs***

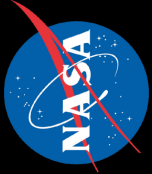
***April 14, 2003***

***Ulf Israelsson***

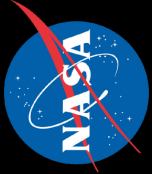
***Jet Propulsion Laboratory***

***California Institute of Technology*** □

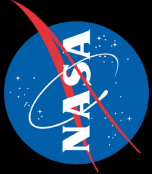
□ This research was performed at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration □



- **Recent NASA Changes**
- ***Growing need for access to space for physicists***
- ***Rationale for updating the Fundamental Physics in Space Roadmap***
- ***Advocacy help from the community***
- **Conclusions**

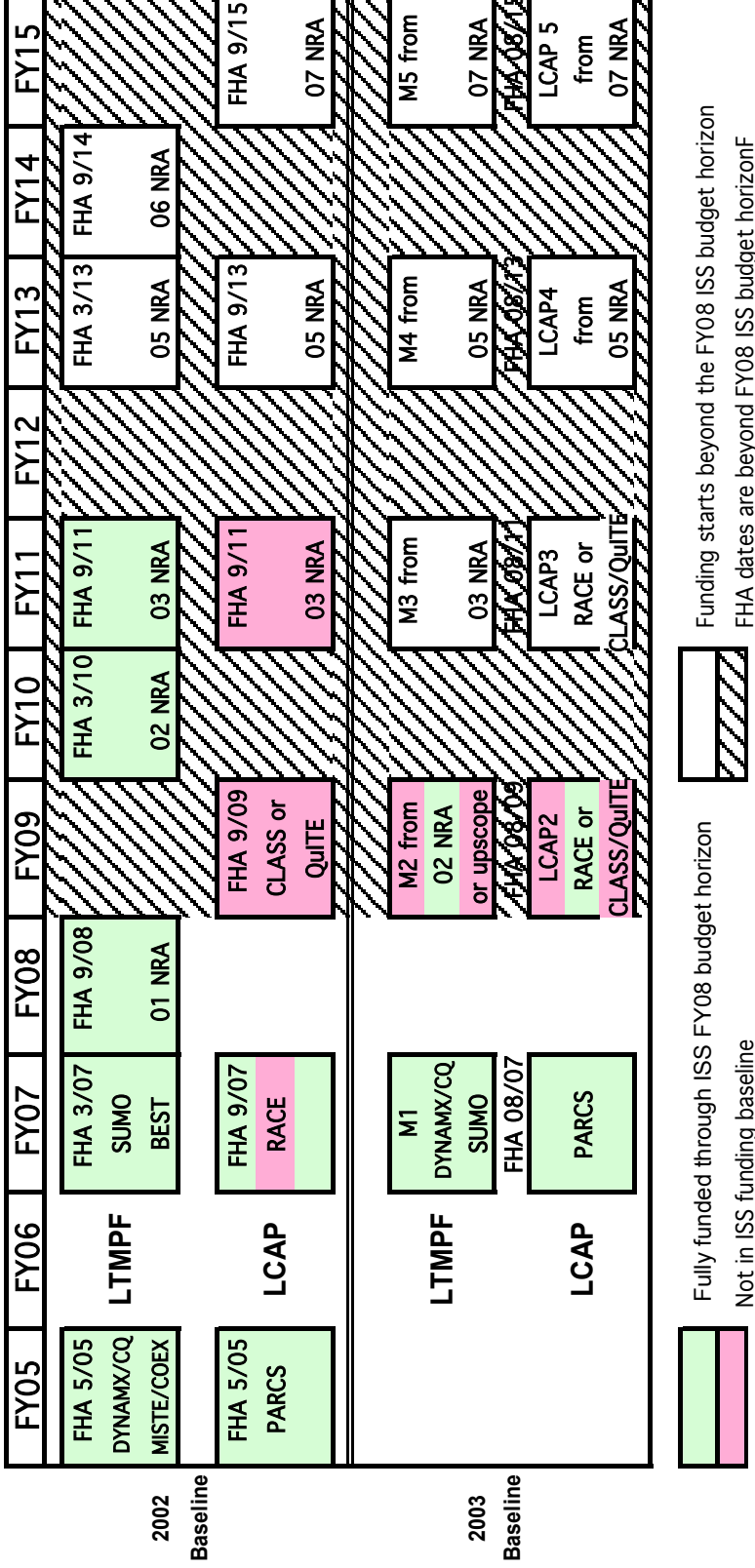


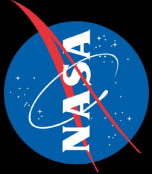
- **REMAP**
  - Increased budget pressure from Life Science disciplines
- **Mary Kicza putting her spin on OBPR**
  - ISS focus on human - tended research
  - Increased importance of Strategic Research
    - Enabling a safe human presence beyond LEO
  - Free flyer initiative seeking a FY05 new start
- **Societal relevance is still important**
- **To measure performance is still a requirement**
- **Columbia disaster**



- **JEM-EF delay has forced a slip of LTMPF and PARCS by 2+ years.**
  - Budget arbitrarily reduced
- **LTMPF-M1 re-programmed with SUMO instead of MISTE.**
  - To maximize science return on first mission
  - Desire to link PARCS and SUMO clocks to further enhance science

Current Fundamental Physics ISS Options compared to 2002 Baseline

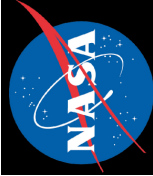




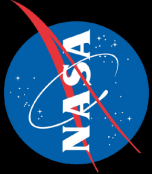
## **Growing need for access to space for physicists**



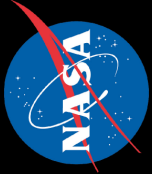
- **Physics is standing at the threshold of major discovery.**
  - Two of our foundational descriptions of nature, quantum mechanics and general relativity, are incompatible with each other.
  - When scientists resolve this conflict, a different view of reality may emerge.
- **Cosmological observations are providing additional clues that our understanding of reality is in need of modification.**
  - Most of the energy content of the Universe resides in unknown dark matter and dark energy that may permeate all of space-time.
- **Resolving the Quantum/gravitation conflict may also shed light on the cosmological unknowns.**
- **Today's availability of high-resolution technology and space access represents a unique opportunity for scientists to address these questions.**
- **Quiescent sub-microgravity freely flying research platforms would enhance the chances of major discovery substantially.**
  - To be discussed on Tuesday afternoon



- **To continue growing as a discipline, we need to establish a new vision of where we are going that is consistent with today’s physics, NASA’s strategic plan, and the new OBPR direction.**
- **1998 Roadmap focused exclusively on Physics, and did not worry about boundaries between OBPR and OSS**
- **Updated Roadmap:**
  - **Must incorporate some strategic research activities to be fully responsive to the current OBPR direction**
  - **Must capture the imagination of OBPR leadership, OMB, and Congress.**
  - **Must delineate OBPR from the “beyond Einstein” program in OSS**
  - **Must address relevancy to Society explicitly**
- **Status of the Roadmap development will be discussed after lunch today.**
  - **Seeking community inputs and endorsement**
- **Draft update targeted for June, final in August**



- **Continue to demonstrate research productivity to NASA**
  - Significant events
  - Press releases
- **Remember that our accomplishments are ultimately evaluated by the scientific community**
  - Prestigious peer reviewed journals reaching a wide audience
- **Continue reaching out to students and the general public**
- **Keep thinking about how your technology improvements might be applied to solve human space exploration issues.**
- **Keep thinking about how your technology improvements might be used for Earth applications to enhance national security or promote industrial prowess.**



■ **Change continues in the NASA environment**

■ **The need for access to space for physicists is growing if we are to fruitfully address today's challenging questions**

■ **A new Roadmap is required to demonstrate the importance of our program to stakeholders**

- Roadmap plans and activities to be discussed after lunch today

■ **Our investigators must continue to advocate the benefits of our program:**

- To NASA and Congress
- To the scientific community
- To students
- To the general public

■ **Our investigators must seek ways to use their advanced technology to support a human presence in space and to develop improved Earth applications**

### **Acknowledgement**

The work described in this presentation was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration