TISSUE EQUIVALENT PROPORTIONAL COUNTER MICRODOSIMETRY MEASUREMENTS UTILIZED ABOARD AIRCRAFT AND IN ACCELERATOR BASED SPACE RADIATION SHIELDING STUDIES

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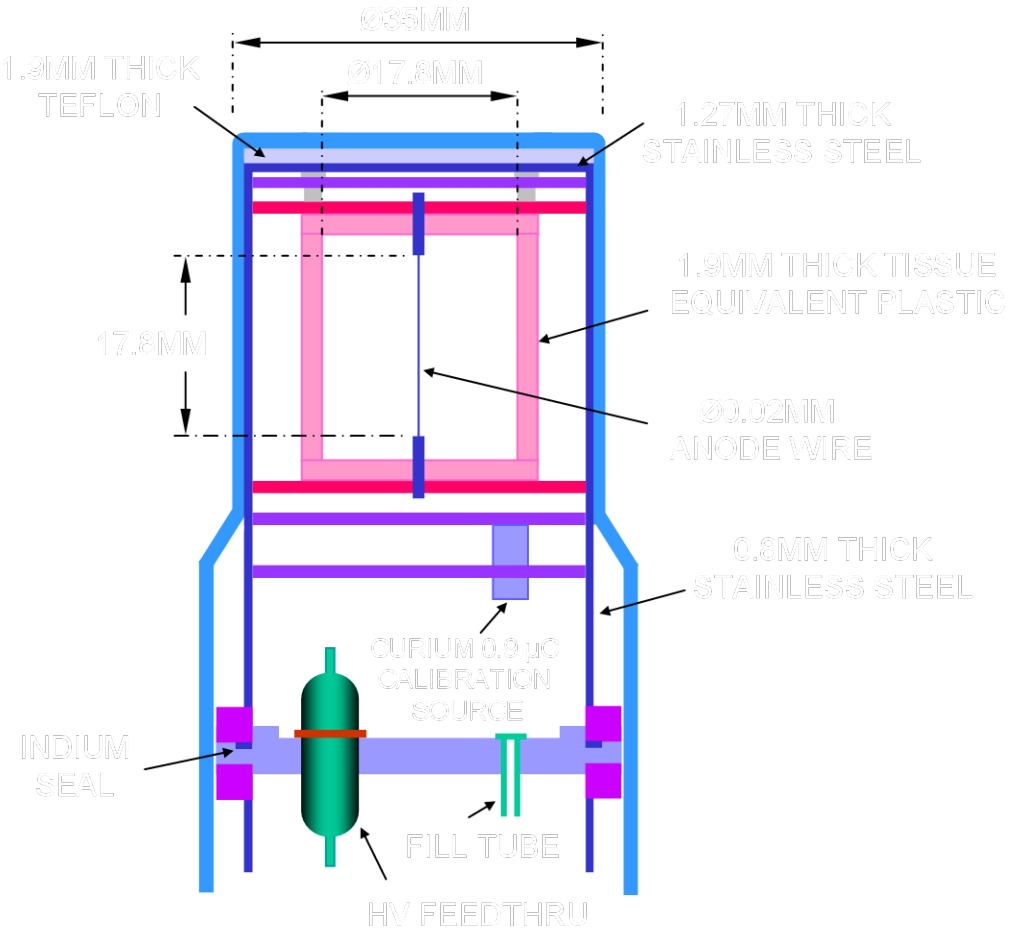
COSPAR 2010, July 24, 2010

Outline

- TEPC Description
- Spatially Restricted LET Model Descriptionb
- High Energy Proton TEPC and Modeling Results
- Shielding Studies and Results
- TEPC Results from Flight Exposures

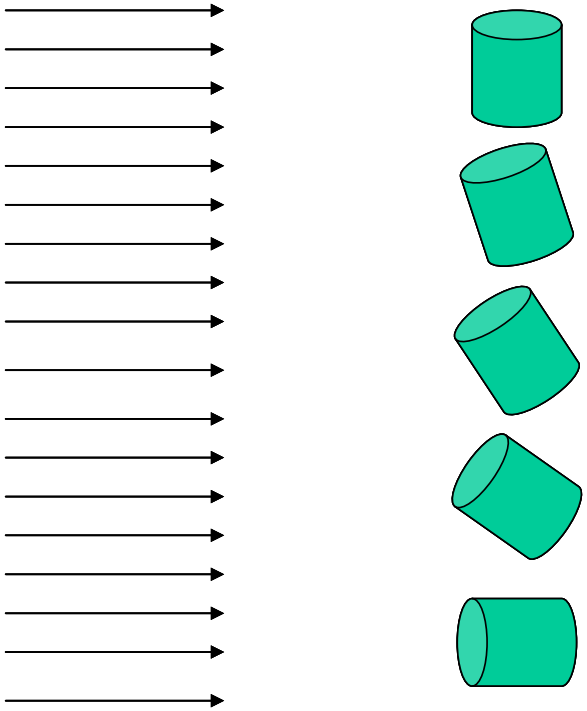


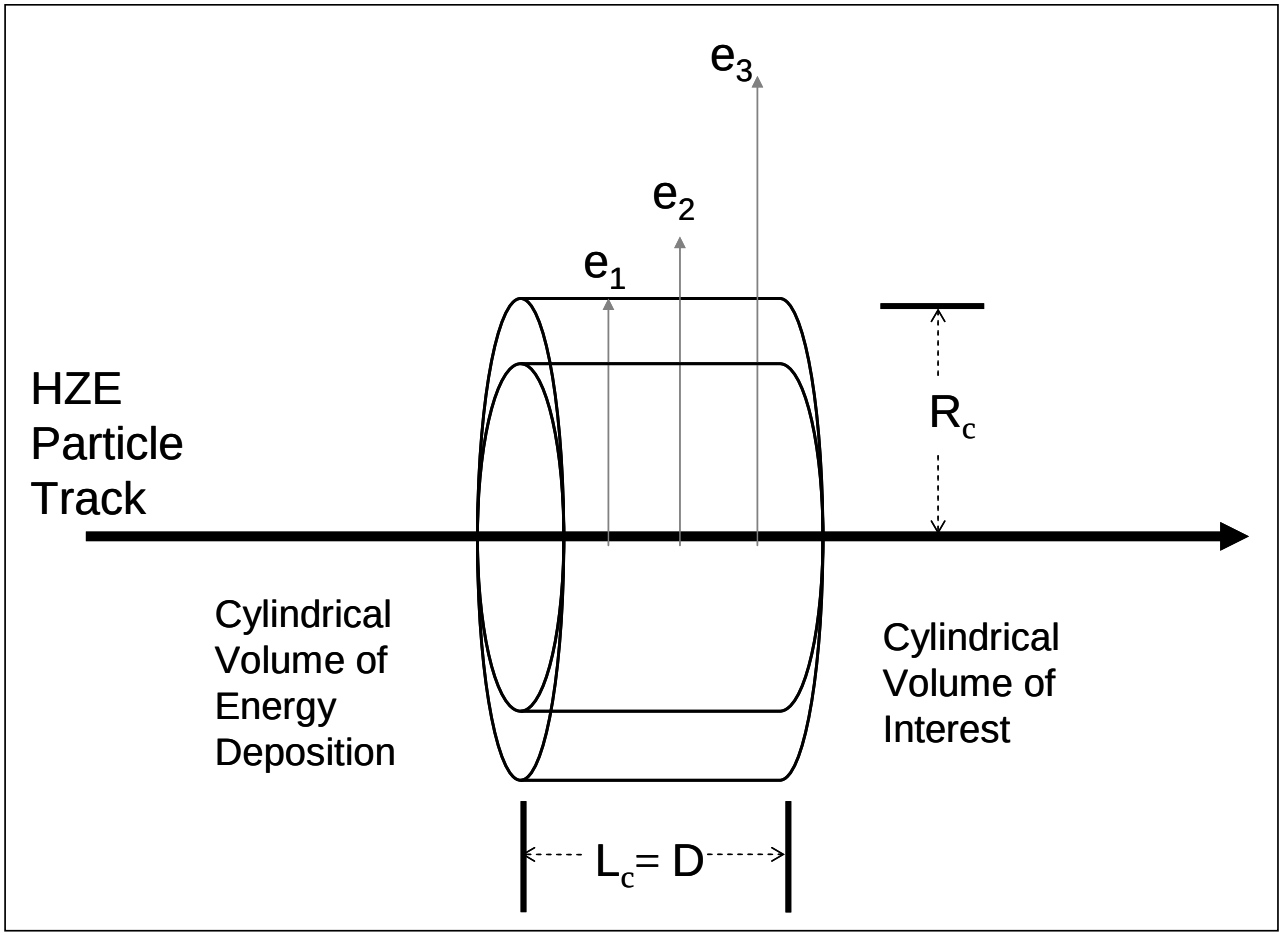
A schematic of the TEPC detector

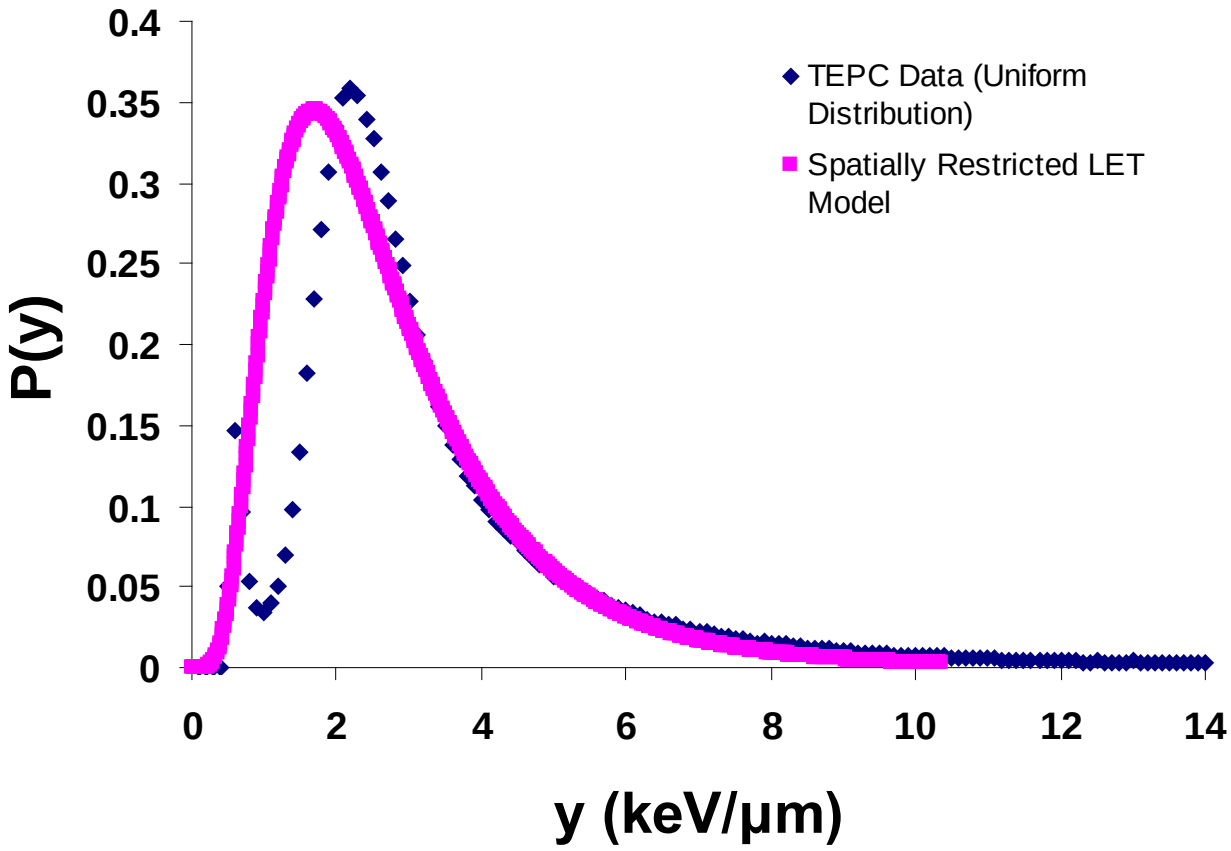
TEPC Active

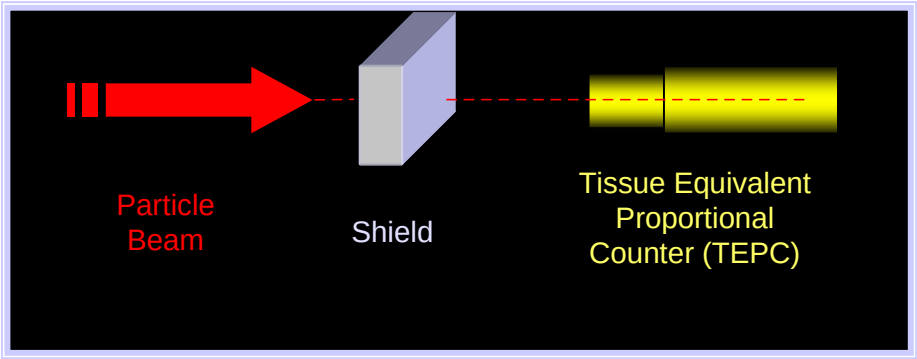
Particle Beam

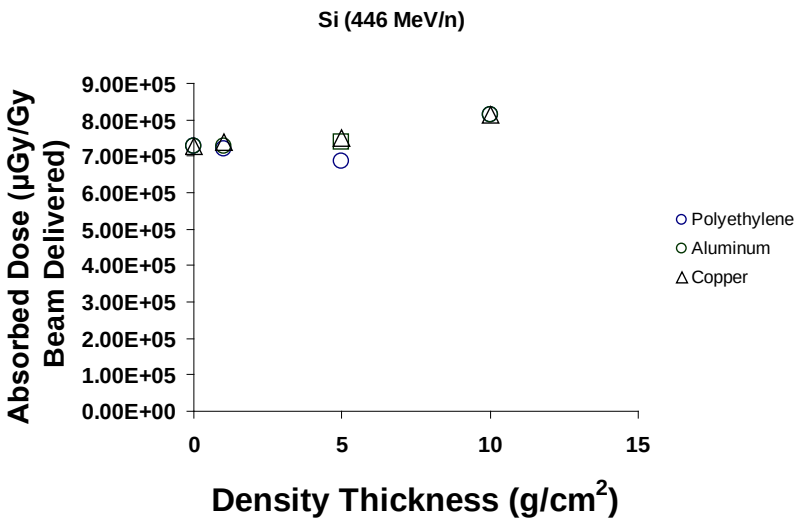
Volume Orientations

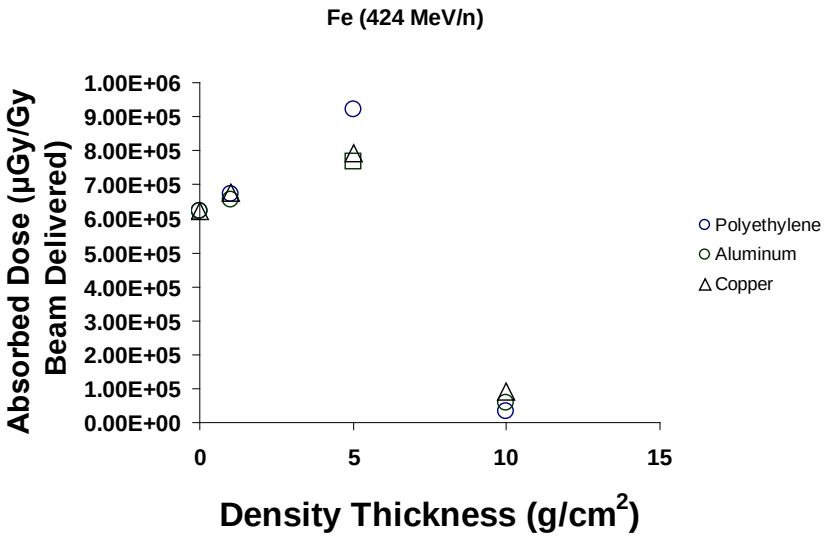



e_3
e_2
e_1
HZE Particle Track
R_c
Cylindrical Volume of Energy Deposition
Cylindrical Volume of Interest
$L_c = D$


0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
P(y)
0
2
4
6
8
10
12
14
y (keV/µm)
TEPC Data (Uniform Distribution)
Spatially Restricted LET Model

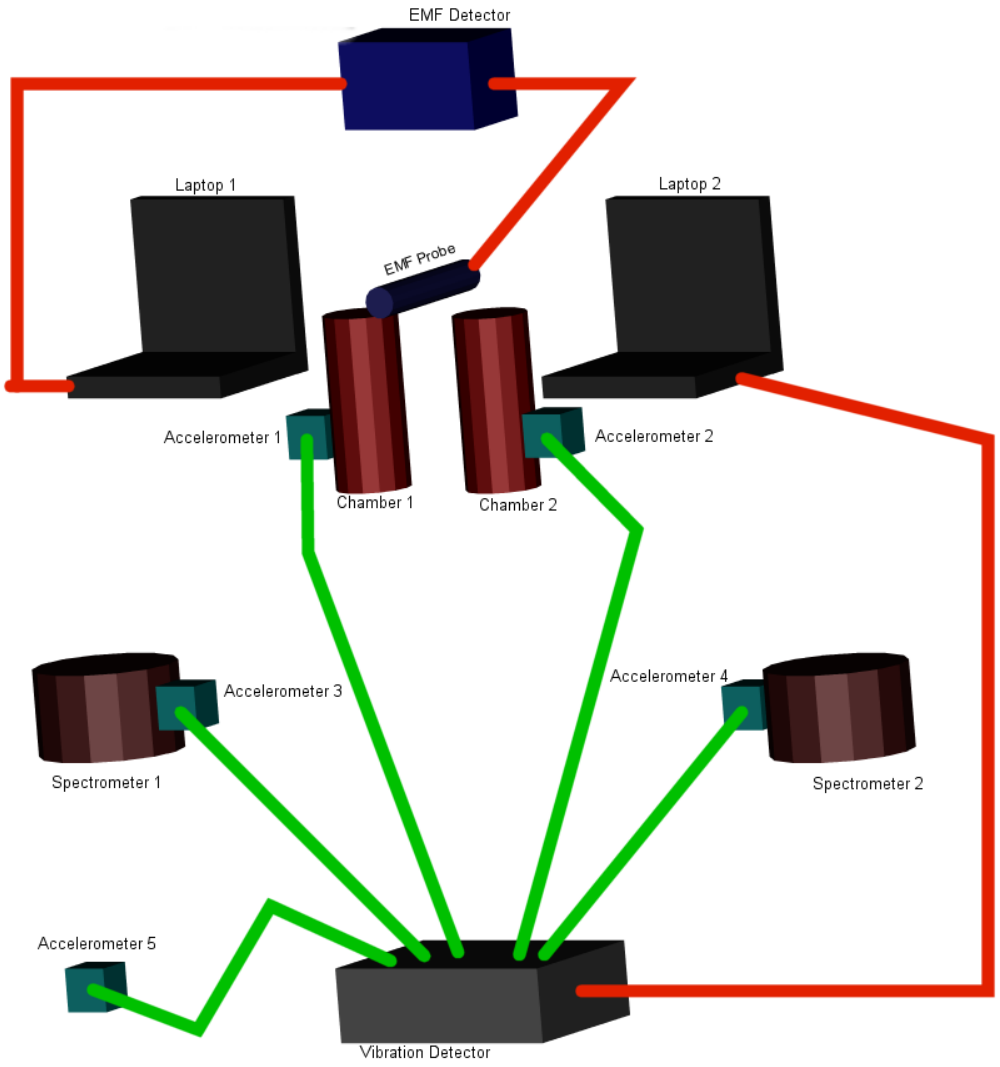

Particle Beam
Shield
Tissue Equivalent Proportional Counter (TEPC)

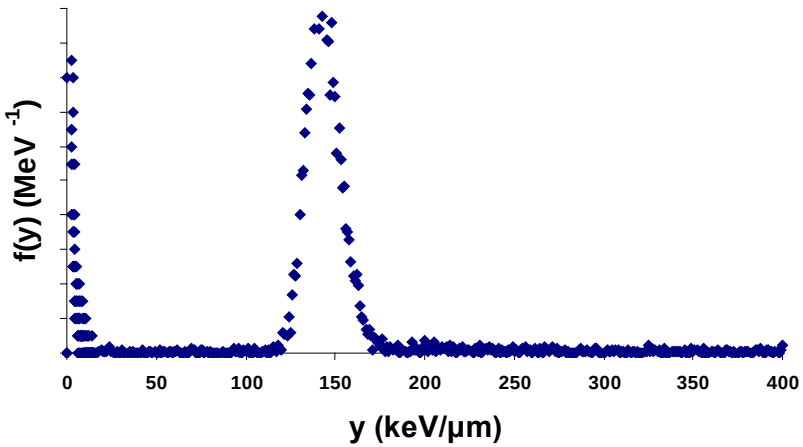

Si (446 MeV/n)
Absorbed Dose (µGy/Gy Beam Delivered)
9.00E+05
8.00E+05
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
0
5
10
15
Density Thickness (g/cm2)
Polyethylene
Aluminum
Copper

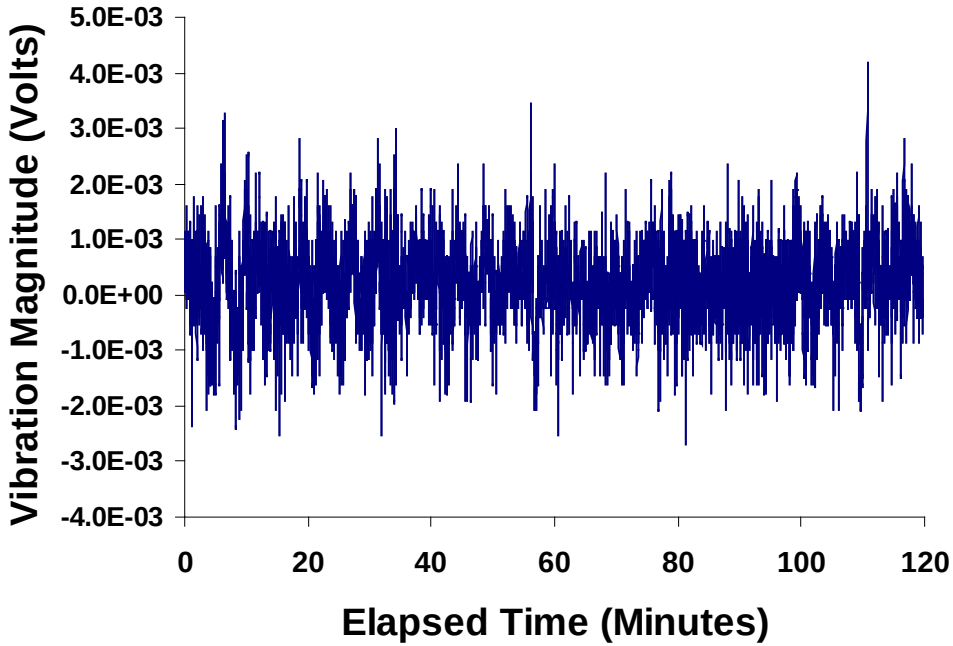

Fe (424 MeV/n)
Absorbed Dose (µGy/Gy Beam Delivered)
1.00E+06
9.00E+05
8.00E+05
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
0
5
10
15
Density Thickness (g/cm2)
Polyethylene
Aluminum
Copper

KC135 Microgravity Flight
Correlated TEPC Response Function Changes and Anomalies With:

- Vibration
- Electromagnetic fields
- Three gravity environments (0.0, 1.0, 1.8 g's)


EMF Detector
Laptop 1
Laptop 2
EMF Probe
Accelerometer 1
Accelerometer 2
Chamber 1
Chamber 2
Accelerometer 3
Accelerometer 4
Spectrometer 1
Spectrometer 2
Accelerometer 5
Vibration Detector


f(y) (MeV -1)
0
50
100
150
200
250
300
350
400
y (keV/µm)


Vibration Magnitude (Volts)
5.0E-03
4.0E-03
3.0E-03
2.0E-03
1.0E-03
0.0E+00
-1.0E-03
-2.0E-03
-3.0E-03
-4.0E-03
0
20
40
60
80
100
120
Elapsed Time (Minutes)

Thank You

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E17-0029-10 11:30 - 11:55 (solicited)
FUV and X-ray Absorption in the Warm-Hot Intergalactic Medium
Richter, Philipp

E17-0030-10 11:55 - 12:20 (solicited)
Search for emission from warm-hot intergalactic medium
Takei, Yoh; Ohashi, Takaya; Sato, Kosuke; Mitsuishi, Ikuyuki; Branchini, Enzo; Ursino, Eugenio; Corsi, Alessandra

E17-0031-10 12:20 - 12:45 (solicited)
The warm-hot intergalactic medium
Schaye, Joop

E17-0032-10 12:45 - 13:00
Intergalactic Medium near High Redshift Star-Forming Galaxies
Rakic, Olivera; Schaye, Joop; Steidel, Charles; Rudie, Gwen; Aguirre, Anthony

Sat, Jul 24, 2010

E19 New Insights into the Physics of Supernova Remnants and Pulsar Wind Nebulae

Main Scientific Organizer: Safi-Harb, Samar
Deputy Organizer: Kothes, Roland

Compact Objects/Magnetars Associations
Chair: Leahy, Denis
Room: Hall 4.1 / Uranus

E19-0042-10 09:30 - 10:00 (solicited)
Anti-Magnetars: Exotic New Class of High Energy Pulsars
Gotthelf, Eric; Halpern, Jules

E19-0043-10 10:00 - 10:15
The First Results of Monitoring Galactic Magnetar Activities with MAXI/GSC
Nakagawa, Yujin Team: MAXI Team p. 403

E19-0044-10 10:15 - 10:30
On the progenitors and environments of high magnetic field pulsars and magnetars: the case for SNR Kes 73 associated with AXP 1E 1841-045
Kumar, Harsha Sanjeev; Safi-Harb, Samar; Slane, Patrick; Gotthelf, Eric

E19-0045-10 10:30 - 11:00
POSTER PRESENTATIONS FOR SATURDAY MORNING SESSION 10:30-11:00
Safi-Harb, Samar

Coffee Break

Exciting New Objects
Chair: Becker, Werner
Room: Hall 4.1 / Uranus

E19-0046-10 11:30 - 12:00 (solicited)
G1.9+0.3 and Other Young Supernova Remnants: New Insights into Particle Acceleration and Progenitors
Reynolds, Stephen

E19-0047-10 12:00 - 12:15
Discovery of Supernova Remnant G310.6-1.6 and its 31ms Energetic X-ray Pulsar PSR J1400-6325
Renaud, Matthieu; Gotthelf, Eric; Manchester, Richard; Terrier, Regis; Mattana, Fabio; Rodriguez, Jerome; Tomsick, John; Lebrun, Francois

E19-0048-10 12:15 - 12:30
HESS J1731-347 : a new TeV shell-type SNR ?
Acero, Fabio; Nukri, Komin; Puehlhofer, Gerd Team: H.E.S.S. Collaboration p. 399

E19-0049-10 12:30 - 13:00 (solicited)
Supernova remnants: what we have learnt and where we are going
Chevalier, Roger

Sat, Jul 24, 2010

F24 Space Radiation Dosimetry in LEO and Beyond

Main Scientific Organizer: Reitz, Guenther
Deputy Organizer: Narici, Livio

Space Radiation Dosimetry VII
Chair: Berger, Thomas
Room: CCB / Focke-Wulf

F24-0025-10 09:30 - 09:50
Intercomparison measurements with energy deposition spectrometer Liulin and TEPC Hawk at HIMAC, and related calculations with PHITS
Ploc, Ondrej; Uchihori, Yukio; Kitamura, H.; Kodaira, S.; Dachev, Tsvetan; Spurny, Frantisek; Jadrnickova, Iva; Mrazova, Zlata; Kubancak, Jan

F24-0026-10 09:50 - 10:10
Radiation beamline testbeds for the simulation of planetary and spacecraft environments for human and robotic mission risk assessment
Wilkins, Richard

F24-0027-10 10:10 - 10:30
Space radiation shielding studies for astronaut and electronic component risk assessment
Fuchs, Jordan; Gersey, Brad; Wilkins, Richard

F24-0028-10 10:30 - 10:50
Models of dosimetry measurements with proportional counters and semiconductor detectors in polar low Earth orbits
Hirn, Attila; Zabori, Balazs

Coffee Break

Space Radiation Dosimetry VIII
Chair: Berger, Thomas
Room: CCB / Focke-Wulf

F24-0029-10 11:30 - 11:50
Characterization of a Tissue-Equivalent Dosimeter based on CMOS Solid-State Photomultipliers
Johnson, Erik; Benton, Eric; Stapels, Christopher; Chrsitian, James; Chen, Xiao Jie

F24-0030-10 11:50 - 12:10
Tissue equivalent proportional counter microdosimetry measurements utililzed aboard aircraft and in accelerator based space radiation shielding studies
Gersey, Brad; Wilkins, Richard

F24-0031-10 12:10 - 12:30
Space Radiation Dosimetry with the The Radiation Assessment Detector (RAD) on the Mars Science Laboratory (MSL)
Hassler, Donald M.; Zeitlin, Cary; Wimmer-Schweingruber, Robert F.; Boehm, Eckhardt; Boettcher, Stephan; Burmeister, Soenke; Cucinotta, Francis A.; Kortmann, Onno; Martin, Cesar; Posner, Arik; Rafkin, Scot; Reitz, Guenther

F24-0032-10 12:30 - 12:50
A Portable In-Flight Radiation Monitor Having the Ability of Particle Discrimination
Yasuda, Hiroshi; Yajima, Kazuaki; Takada, Masashi; Nakamura, Takashi; Fukuda, Mitsuhiro

F24-0033-10 12:50 - 13:10
Dosimetry and Vibration measurements in BIOLAB and EMCS (Dos-ViBE)
Ideström, Johan Olof; Anken, Ralf Hendrik; Reitz, Guenther; Berger, Thomas; Hauslage, Jens; Schuber, Marianne; Fossum, Knut R.; Vanhavere, Filip

Sat, Jul 24, 2010

F34 Habitability of Mars

Main Scientific Organizer: Navarro-Gonzalez, Rafael
Deputy Organizer: Coll, Patrice

Chair: Ehrenfreund, Pascale
Room: CCB / Danzig

F34-0008-10 09:30 - 09:50
Liquid cryobrines and habitability in the subsurface of Mars
Möhlmann, Diedrich

F34-0009-10 09:50 - 10:10
MARTIAN HABITABILITY STUDIES IN TWO FIELD EARTH ANALOGUES: THE PERMAFROST IN THE IMURUK LAKE BASALTIC FIELD (ALASKA) AND THE ATACAMA DESERT
Gómez-Gómez, Felipe; Rodriguez-Manfredi, Jose-Antonio; Perez, Lidia; Prieto-Ballesteros, Olga; Amils, Ricardo; Gomez-Elvira, Javier

F34-0010-10 10:10 - 10:30
Habitability of Mars: hyperthermophiles in permafrost
Gilichinsky, David; Rivkina, Elizaveta; Vishnivetskaya, Tatiana; Felipe, Gomez; Mironov, Vasilii; Blamey, Jenny; Ramos, Miguel; De Pablo, Miguel Ángel; Castro, Miguel; Boehmwald, Freddy

F34-0011-10 10:30 - 11:00 (solicited)
Habitability Assessment on Earth in Preparation for Mars Science Laboratory
Conrad, Pamela; Mahaffy, Paul

Coffee Break

Chair: Coll, Patrice
Room: CCB / Danzig

F34-0012-10 11:30 - 12:00 (solicited)
How MOMA will search for Life bio-indicators at Mars in 2018 ?
Coll, Patrice; Goesmann, Fred; Raulin, Francois; Becker, Luann; Szopa, Cyril; Buch, Arnaud; Pinnick, Veronika; Harald, Steininger; Sternberg, Robert; FREISSINET, Caroline Team: MOMA p. 404

F34-0013-10 12:00 - 12:30
EuroGeoMars Field Campaign: habitability studies in preparation for future Mars missions
Ehrenfreund, Pascale Team: EuroGeoMars MDRS Crew 77 p. 397

F34-0014-10 12:30 - 12:50
ACCESS MARS: Study of the viability of Mars Caves as an alternative to surface-based habitation solutions
Perez-Poch, Antoni; Laufer, Ren; Zavaleta, Jhony; Davila, Alfonso; Gallardo, Beatriz; Antonakopoulos, Konstantinos; De Carufel, Guy

Sat, Jul 24, 2010

F44 Influence of Spaceflight Environments on Biological Systems

Main Scientific Organizer: Nechitailo, Galina S.
Deputy Organizer: Kondyurin, Alexey

Chair: Nechitailo, Galina S.
Room: CCB / Bergen

F44-0009-10 09:30 - 10:00 (solicited)
Evolution of crop production under a pseudo-space environment using model plants, Lotus japonicus
Tomita-Yokotani, Kaori; Motohashi, Kyohei; Omi, Naomi; Sato, Seigo; Aoki, Toshio; Hashimoto, Hirofumi; Yamashita, Masamichi

F44-0010-10 10:00 - 10:20
Melanocyte response to gravitational stress: an overview with a focus on the role of cyclic nucleotides
Ivanova, Krassimira; Tsiockas, Wasiliki; Eiermann, Peter; Hauslage, Jens; Hemmersbach, Ruth; Block, Ingrid; Gerzer, Rupert

F44-0011-10 (WITHDRAWN) 10:20 - 10:40
Ribbed newts exposed aboard foton m3 biosatellite: hemopoietic tissue and gamma radiosensitivity of bone and cartilage.
Domaratskaya, Elena; Butorina, Nina; Nikonova, Tatyana; Grigoryan, Eleonora N.; Poplinskaya, Valentina; Hisataka, Kondo; Almeida, Eduardo

F44-0012-10 10:40 - 11:00
Occlusion of carotid artery and hypergravity loading of animals caused similar effects on L-[14C]glutamate uptake in rat brain nerve terminals
Borisova, Tatiana; Sivko, Roman; Krisanova, Natalia

Coffee Break

Chair: Borisova, Tatiana
Room: CCB / Bergen