

**Wednesday, November 5, 2014**  
**PLENARY SESSION II**  
**9:00 a.m. / Building 34 -Conference Room W150**

**Chairs: M. Grande (Aberystwyth U., UK)**  
**C. Nixon (GSFC)**

- 9:00 a.m. Grotzinger J. P. \* Science Team M. S. L.  
*Geologic, geochemical and mineralogic framework for Aeolis Palus bedrock, and its relationship to Mt. Sharp, Mars* [#1135]  
Curiosity's instruments have documented an impressive set of sedimentary and igneous rock compositions, preserved as part of fluvial-deltaic-lacustrine environment, indicating a habitable paleoenvironment at Gale crater.

**Wednesday, November 5, 2014**  
**INSTRUMENTATION FOR NEXT GENERATION ORBITERS (I)**  
**9:30 a.m. / Building 34 -Conference Room W150**

**Chairs: M. Grande (Aberystwyth U., UK)**  
**C. Nixon (GSFC)**

- 9:30 a.m. Grasset O. \* Altobelli N. Barabash S. Iess L. Jaumann R. et al.  
*The Jupiter Icy Moons Explorer (JUICE): Complementarity Of The Payload In Addressing The Mission Science Objectives.* [#1141]  
Invited Speaker.
- 9:50 a.m. Bergsrud C. M. \* Straub J.  
*Using Space Solar Power Satellites to Aid in Planetary Science Discovery and Exploration* [#1000]  
This paper presents an overview of the space solar power satellite technology, and its application to planetary science missions. It details how it can drive lower costs and discusses prospective cost savings in the context of two example missions.
- 10:05 a.m. Korth H. \* Strohbahn K. Kitching J.  
*Miniature Absolute Scalar Magnetometer Based on the Rubidium Isotope  $87\text{Rb}$*  [#1016]  
Presented is a low-resource, miniaturized, absolute scalar magnetometer based on the isotope  $87\text{Rb}$ , which has a mass of <500 g and uses 0.5 W of power, while maintaining sensitivity comparable to present state-of-the-art absolute magnetometers.
- 10:20 a.m. Mariani G. \* Kenyon M.  
*Radiometric Mapping of Europa: Challenges of Building a Radiation-Hardened, Uncooled, Far-Infrared Thermal Imager* [#1017]  
Thermopile technology integrated with state-of-the-art readout chips provides a far-infrared, uncooled, radiation-hardened, thermal imaging solution to conduct accurate radiometric measurements of Europa.

- 10:35 a.m. Darrach M. \* Farley K. Madzunkov S. Nikolic D. Niedholdt E. et al.  
Mass Analyzer for Real-time Investigation of Neutrals at Europa (MARINE) [#1018]  
 Presented herein is a summary of the Mass Analyzer for Real-time Investigation of Neutrals at Europa (MARINE). MARINE new mass analyzer for analysis the exospheres of planets, moons, and primitive bodies, such as found at Europa or Enceladus.
- 10:50 a.m. **COFFEE BREAK**
- 11:10 a.m. Griggs C. E. \* Paik H. J. Moody M. V. Han S. C. Rowlands D. D. et al.  
Levitated Superconducting Gravity Gradiometer for Planetary Missions [#1021]  
 We are developing an accurate tensor superconducting gravity gradiometer for planetary missions. A new and innovative design gives a sensitivity  $< 1 \text{ mE Hz}^{(-1/2)}$  in the measurement band 1 mHz to 0.1 Hz for a device with a baseline just over 10 cm.
- 11:25 a.m. Chattopadhyay G. \* Reck T. J. Tang A. Jung-Kubiak C. Lee C. et al.  
Silicon Micromachined High-Resolution Terahertz Spectroscopic Instrument for Planetary Missions [#1022]  
 Using newly developed silicon micromachining technology we are developing a low-mass and highly integrated state-of-the-art terahertz radiometer/spectrometer instrument for planetary orbiter missions to Mars, Venus, Titan, and the Galilean moons.
- 11:40 a.m. Sternovsky Z. \* Gruen E. Horanyi M. Kempf S. Maute K. et al.  
Hyperdust: Advanced instrument for the in-situ detection and chemical analysis of cosmic dust particles [#1023]  
 The Hyperdust instrument is developed for future missions for the composition and trajectory analysis of interstellar and interplanetary particles, as well as surface composition analysis of airless planetary objects.
- 11:55 a.m. Lingenauber K. \* Hussmann H. Michaelis H. Oberst J. Kobayashi M. et al.  
The Ganymede Laser Altimeter (GALA) on ESA's JUICE mission: Overview of the Instrument Design. [#1029]  
 ESA's Jupiter Icy Moons Explorer (JUICE) will launch in 2022 and arrive at Jupiter in 2029. The Ganymede Laser Altimeter (GALA) will focus on geodetic and geophysical investigations of the icy satellites Europa, Callisto and Ganymede.
- 12:10 p.m. **LUNCH BREAK**

**Wednesday, November 5, 2014**  
**INSTRUMENTS ON FUTURE MARS LANDERS (I)**  
**9:30 a.m. / Building 34- Conference Room W120 A&B**

**Chairs: R. Jaumann (DLR, Germany)**  
**C. Stahle (GSFC)**

- 9:30 a.m. Mahaffy P. R. \* Arevalo R. Brinckerhoff W. B. Caartwright J. A. Conrad P. G. et al.  
*AGES: A Noble Gas Mass Spectrometer for Future in Situ Cosmic Radiation Exposure Age and K-Ar Chronology Investigations* [#1028]  
The AGES mass spectrometer proposed for a future Mars, Lunar, asteroid, or Phobos mission provides definitive in situ measurements of cosmogenically and radiogenically produced noble gases to implement in situ chronology investigations.
- 9:45 a.m. Sinclair J. A. \* Wilson E. L. Irwin P. G. J. Calcutt S.  
*Detecting trace species in the Martian atmosphere with a gas correlation filter radiometer* [#1038]  
We present the potential of a gas correlation radiometer in detecting trace gases in the Martian atmosphere, such as methane and sulphur dioxide. These species would serve as tracers of geological, and perhaps biological activity on Mars.
- 10:00 a.m. Schmitz N. \* Jaumann R. Coates A. J. Griffiths A. D. Leff C. E. et al.  
*PanCam on the ExoMars 2018 Rover: A Stereo, Multispectral and High-Resolution Camera System to Investigate the Surface of Mars* [#1053]  
The ExoMars rover will carry a Panoramic Camera System (“PanCam”) being designed to obtain high-resolution colour and wide-angle multi-spectral stereoscopic panoramic images from the rover mast.
- 10:15 a.m. Yu H. \* Garnero E. Fouch M.  
*Molecular Electronic Transducers Based Micro-Seismometers for Planetary Exploration* [#1055]  
A Molecular Electronic Transducers based micro seismometers are under development, which are robust (orientation independent and high shock tolerant) with low power, low mass, and relatively low cost and can be deployed flexibly across a broad range.
- 10:30 a.m. Lorenz R. D. \*  
*Micropower Instrumentation Needs for an RHU-powered Mars Mini-Network Mission* [#1062]  
A network of affordable Mars landers (“MASER”) able to operate year-round is enabled by a radioisotope heater units (RHU) power system (~200mWe) Continuous seismic and wind measurements require new instrument designs able to operate on ~50mW.
- 11:50 a.m. **COFFEE BREAK**
- 11:05 a.m. Rafkin S. C. R. \* Banfield D. Nowicki K. Silver J. Dissly R.  
*An Instrument to Measure Turbulent Fluxes in the Atmosphere of Mars and Other Planets* [#1063]  
A newly developed instrument capable of simultaneously measuring turbulent fluxes in planetary atmospheres has been developed. The focus to date has been for Mars, but can be adapted to other atmospheres such as Venus, Titan, and gas or ice giants.

- 11:20 a.m. Arruego I. \*  
*A Roadmap for the Development of Miniature Instrumentation for Mars Exploration. [#1068]*  
We report on a 10-year initiative to set up a number of resources for the development of miniature instruments for Planetary Exploration. Thanks to it, we are involved in 2 Mars exploration missions: Mars MetNet Lander and ExoMars 2016 EDM.
- 11:35 a.m. Olcott Marshall A. Marshall C. P. \*  
*Challenges facing Raman spectroscopy on Mars: Lessons from an Earth based analog [#1070]*  
Here we explore the best excitation wavelength ranging from UV, Vis, and NIR for Raman analysis of samples from a Mars analog.
- 11:50 a.m. Apestigue V. \* Jiménez J. J. Martínez J. Álvarez F. J. Rivas J. et al.  
*DREAMS-SIS: A Miniature Instrument for the Measurement of Atmospheric Optical Depth on ExoMars2016 EDM. [#1075]*  
The DREAMS-SIS sensor, a miniature photometer that will be part of the DREAMS payload package on board ExoMars 2016 EDM, is presented. We report on the design, development, calibration and qualification processes, as well as present status.
- 12:05 p.m. **LUNCH BREAK**

**Wednesday, November 5, 2014**  
**INSTRUMENTATION FOR NEXT GENERATION ORBITERS (II)**  
**1:15 p.m. / Building 34 -Conference Room W150**

**Chairs: C. Webster (JPL)**  
**S. Milam (GSFC)**

- 1:15 p.m. Dougherty M. K. \* the J-MAG Team  
*J-MAG : The Magnetometer instrument on JUICE* [#1030]  
The JUICE magnetometer instrument, J-MAG, will be described.
- 1:35 p.m. André N. \* Fedorov A. Paschalidis N. Sittler E. C. Jr. Cooper J. F.  
*PASTELS: an Innovative Rad-Hard, Low-Mass Spectrometer for Electron and Negative Ion Characterization in Planetary Environments(Europa, comets, Enceladus, Titan, ...)* [#1032]  
The Particle Analyzers for Suprathermal and Thermal ELEctronegative Species (PASTELS) consist of a compact, low mass, highly capable sensor based on a design carefully optimized for the plasma and radiation environment encountered around Europa.
- 1:50 p.m. Carter L. M. \* Rincon R. F. Neish C. D.  
*SESAR: A Digital Beamforming Polarimetric SAR for Near-Surface Imaging* [#1033]  
We discuss development of an advanced digital beamforming radar instrument concept that can be used to image near-surface geology such as potential ice layers and volcanic and sedimentary stratigraphy.
- 2:05 p.m. Lindeman M. A. \* Kleinsasser A. W. Bumble B. Day P. K. Holmes W. A.  
*YBCO Kinetic Inductance Bolometers for Hyperspectral Imaging of Cold Planetary Objects* [#1042]  
We are developing kinetic inductance bolometers to function in hyperspectral imaging instruments for the characterization of the surfaces of cold planetary bodies of the outer solar system in the mid to far infrared bands.
- 2:20 p.m. Sittler E. C. Jr. \* Cooper J. F. Paschalidis N. MacDonald E. A. Ali A. et al.  
*Advanced Ion Mass Spectrometer for Giant Planet Ionospheres, Magnetospheres and Moons* [#1043]  
The Advanced Ion Mass Spectrometer is designed to measure elemental, isotopic, and simple molecular composition abundances of 1 eV to 25 keV ions in the 1 – 60 amu mass range at mass resolution  $M/\Delta M \leq 60$  within penetrating radiation environments.
- 2:35 p.m. Brageot E. C. \* Drouin B. J. Kenyon M. E. Paige D. A. Johnson W. R.  
*Designing Visible Through FAR Infrared Remote-Sending Instruments Based On A New Generation Of Thermopiles* [#1126]  
We present the capabilities of three different multi-spectral visible to far-IR radiometers for Trojan Tour and Rendezvous, Europa Clipper and Earth thermal climate sounding using the new generation of uncooled thermopile arrays developed at JPL.
- 2:50 p.m. Goldsten J. O. \* Maurer R. H. Mauk B. H.  
*ERM: An engineering radiation monitor for high dose missions* [#1105]  
Missions to the moons of Jupiter must handle extreme radiation environments. Given these can be very dynamic, mission planners, spacecraft operators, and scientists can all benefit from a radiation monitor that provides dose and charging rate data.
- 3:05 p.m. **COFFEE BREAK**

**Wednesday, November 5, 2014**  
**INSTRUMENTS ON FUTURE MARS LANDERS (II)**  
**1:15 p.m. / Building 34 -Conference Room W120 A&B**

**Chairs: P. Beauchamp (JPL)**  
**M. Trainer (GSFC)**

- 1:15 p.m. Vago J. L. \* Witasse O. Rodionov D. ExoMars Team  
*Searching for Traces of Life with the ExoMars Rover* [#1132]  
This presentation will concentrate on the ExoMars rover mission (including science objectives, instrumentation, and upcoming milestones), as well as briefly report on the progress achieved toward the identification of suitable landing sites.
- 1:35 p.m. Steininger H. \* Goesmann F. Raulin F. Brinckerhoff W. B. MOMA Team  
*Detecting Organics with the Mars Organic Molecule Analyzer (MOMA) on the 2018 ExoMars Rover* [#1098]  
The Mars Organic Molecule Analyzer (MOMA) is a combined pyrolysis gas chromatograph mass spectrometer (GC-MS) and laser desorption mass spectrometer (LD-MS). It will be the key instrument of the ESA Roscosmos ExoMars 2018 mission.
- 1:50 p.m. Elliott H. M. \* Renno N. O. Preston R. A. Ruf C. S. Oudrhiri K. et al.  
*A Ground-Penetrating Radar and Radiometer to Study the Shallow Subsurface of Mars and Other Solar System Bodies* [#1082]  
An overview of the Mars Radar and Radiometry Sub-surface Investigation (MARRSI), a novel type of scientific instrument that makes dual use of the radio communication systems to studying the shallow subsurface of planetary bodies.
- 2:05 p.m. Neumann G. A. \* Garvin J. B. Blair J. B. Bufton J. L. Coyle D. B.  
*Lidar Imaging of Topography with Millimeter Ranging Precision for Proximity Science and Operations from Rovers or Spacecraft* [#1076]  
A new class of lidar sensor has been developed for measuring local topography at millimeter vertical scales for 3-D assessment of context geology and accurate navigation and positioning of surface assets for sample acquisition.
- 2:20 p.m. Cho Y. \* Kameda S. Miura Y. N. Miyamoto H. Sugita S.  
*An In-Situ K-Ar Isochron Dating System for a Mars Rover Mission* [#1157]  
We propose an in-situ K-Ar isochron dating system for a future Mars rover.
- 2:35 p.m. Lambert J. L. \* Wang A. Cooper J. B.  
*Shifted-Excitation Raman Spectroscopic Methodologies Developed for the Compact Integrated Raman Spectrometer (CIRS)* [#1136]  
Experimental results demonstrating two methods of fluorescence suppression are presented using fluorescent PAH's and minerals samples. Both methods use a temperature-tuned green laser that is integrated with the Compact Integrated Raman Spectrometer.
- 2:50 p.m. **END OF SESSION**

**Wednesday, November 5, 2014**  
**INSTRUMENTATION FOR NEXT GENERATION ORBITERS (III)**  
**1:15 p.m. / Building 34 -Conference Room W150**

**Chairs: C. Webster (JPL)**  
**S. Milam (GSFC)**

- 3:35 p.m. Abshire J. B. \* Smith M. D. Riris H. Sun X. Gentry B. M. et al.  
*MARLI: MARs Lidar for global climate measurements from orbit* [#1057]  
We are developing a multifunctional atmospheric lidar (MARLI) for Mars orbit. The lidar approach is to simultaneously measure atmospheric backscatter and depolarization profiles, wind profiles, and range from a near-polar circular orbit.
- 3:50 p.m. Desai M. I. \* Ogasawara K. Ebert R. W. Allegrini F. McComas D. J. et al.  
*Next Generation Plasma and Particle Instrumentation for Planetary Missions* [#1060]  
This talk will focus on novel, miniaturized instrument concepts for plasma and particle measurements on upcoming missions such as the Europa Clipper, Enceladus Orbiter, Trojan Tour and Rendezvous, Uranus Pathfinder etc.
- 4:05 p.m. Barabash S. \* Brandt P. C. Wurz P. Team PEP.  
*Particle Environment Package (PEP) for the ESA JUICE Mission* [#1065]  
PEP is a suite of six sensors that together provide comprehensive in-situ and remote measurements of particle and plasma environments of the Jovian system and its moons over nine decades of energy from <0.001 eV to >1 MeV.
- 4:20 p.m. Kraft R. P. \* Kenter A. T. Murray S. S. Martindale A. Pearson J. et al.  
*A High Speed, Radiation Hard X-ray Imaging Spectrometer for Planetary Investigations* [#1084]  
We present a concept for a X-ray imaging spectrometer using CMOS sensors and a microchannel plate optics. It could determine the composition of the surface of the Galilean moons and airless rocky bodies, and the properties of magnetospheric plasmas.
- 4:35 p.m. Miller T. C. \* Kleinfelder S. Barwick S. Besson D. Connolly A. et al.  
*PRIDE – Passive Radio Ice Depth Experiment - An Instrument to Measure Outer Planet Lunar Ice Depths from Orbit using Neutrinos.* [#1088]  
We describe a low mass, low power passive instrument to measure the thickness of the ice shell on ice moons, by making use of RF signals from high energy neutrinos. This update includes results from the first quarter of a 2014 NIAC Phase 1 grant.
- 4:50 p.m. Quilligan G. \* Aslam S. Lakew B. DuMonthier J. Katz R. et al.  
*A 0.18 $\mu$ m CMOS Thermopile Readout ASIC Immune to 50 Mrad (Si) Total Ionizing Dose and Single Event Latchup to 174 MeV-cm<sup>2</sup>/mg.* [#1096]  
A 180nm CMOS multi-channel digitizer (MCD) ASIC for a thermopile readout was tested for radiation hardness. The chip was found to be immune to single event latchup (SEL) and total ionizing dose (TID) at 174 MeV-cm<sup>2</sup>/mg and 50 Mrad (Si) respectively.
- 5:05 p.m. Wrbanek J. D. \* Wrbanek S. Y. Fralick G. C. Clark P. E. McNeil R. R.  
*Compact Full-Field Ion Detector System for SmallSats beyond LEO* [#1103]  
Under development by NASA GRC, the Compact Full-field Ion Detector System is designed to be capable of being flown on a wide variety of deep space platforms to provide multi-directional, comprehensive measurements of ions in space environments.
- 5:20 p.m. **END OF ORAL SESSION**