Thursday, March 15, 2007
POSTER SESSION II: INSTRUMENTS, TECHNIQUES, AND ENABLING TECHOLOGIES FOR PLANETARY EXPLORATION
6:30 p.m. Fitness Center

Clark P. E. Kessel S. Rilee M. L. Brown G. Cooperrider C. Curtis S. A.
Extreme Mobility: Gaits for Tetrahedral Rovers **[#1172]**
For Prototype 3 addressable reconfigurable high mobility rover, a light 12Tet Walker with 5:1 extension ratio and double sided struts expandable in two directions, we present efficient "amoeboid gaits" inspired by naturally-occurring 3D locomotion.

Fink W. Tarbell M. A.
Tier-Scalable Reconnaissance Mission Test Bed: Implementation of Ground-Tier **[#2410]**
We report on the implementation of the ground-tier of an Earth-based test bed for tier-scalable reconnaissance that enables the development and field-testing of remote planetary exploration strategies and tools, ranging from algorithms to hardware.

Haldemann A. F. C. McHenry M. C. Petras R. Ali K. Bornstein B. Castano R. Cameron J. M. Estlin T. A. Farr T. G. Gaines D. Jain A. Lim C. Nesnas I. A. Pomerantz M. Powell M. W. Volpe R. A.
Simulation to Evaluate Autonomous Behaviors for Mobile Planetary Surface Science Missions **[#1732]**
Testing autonomous robotic technologies as they might be used for scientific exploration of planetary surfaces can effectively be achieved using advanced simulation capabilities.

Fennema A. M. Bode R. Swindle T. D.
A Method for Finding the Mass of a Milligram-sized Rock Sample Without Using a Scale, with Possible Spacecraft Applications **[#1772]**
Experiments on samples of six different compositions show that it is possible to determine a mass to within 10% by measuring the volume of a melted sample and calculating its density.

Helbert J. Müller N.
SurVenTIS — Surface of Venus Thermal Imaging System **[#2201]**
SurVenTIS is a near-IR imager with six filters taking advantage of the spectral windows in the atmosphere of Venus. It will allow the study of the surface composition of Venus on spatial scales intermediate between orbital and *in situ* data.

Mungas G. S. Peters G. H. Smith J. A. Bearman G. H. Beegle L. W. Struthers C. Glucoft J.
H_2O Sublimation Alteration of Icy Martian Samples Due to Mechanical Work, Heat and Mass Transport **[#2002]**
Sample acquisition processes that excavate material generate heat through friction that can thermally alter samples. We discuss relevant heat and mass transport experiments for ultimately estimating sublimation mass loss during acquisition of icy samples.

Nehéz I. Varga T. Darányi I. Bérczi Sz.
Gas Storing in Martian Atmospheric Environment Using Nil Diffusion Covering Technology **[#1367]**
Nil Diffusion (ND) covering is used for long term storing of gases in the martian atmosphere. ND covering consists of several separated material layers treated with active isolation, with one or more separator spaces between the layers.

Castano R. Estlin T. Anderson R. C. Gaines D. Bornstein B. Chouinard C. Burl M. Castano A. Judd M.
Onboard Rover End-of-Day and Traverse Science **[#1971]**
The Onboard Autonomous Science Investigation System (OASIS) was used to demonstrate onboard science in a formal demonstration of closed loop opportunistic detection and reaction during a rover traverse as well as end-of-day science on the FIDO rover.

Hardgrove C. J. Moersch J. E. Drake D. M.
Simulations of Rover Based Neutron Remote Sensing of Periglacial Features on Mars **[#1786]**
Neutron spectrometers will be included as part of future rover instrument suites. Traverses toward periglacial polygonal cracks are simulated using MCNPX. The observed hydrogen content can be used to suggest a method of formation or past martian climate and ground ice conditions.

Anderson F. S. Whitaker T. J. Pilger E. Sherman S. Miller G. Young D. Peterson B. Mahoney J. Norman M.
Mars Age Experiment (MAX) **[#2153]**
We show initial results from a miniature laser ablation resonance ionization mass spectrometer (LA-RI-MS) for *in situ* rubidium and strontium (Rb-Sr) geochronology and geochemical measurements on Mars.

McKay C. P. Hecht M. H. Stoker C. Briggs G. Clark B. Cooper G. A. Glass B. Gulick V. Lambert J. Zacny K. Nakagawa R. Chadbourne P.
Science Goals for Deep Drilling in Ice-rich Permafrost on Mars **[#1468]**
In this paper we consider the scientific rationale for a deep drilling mission (~4 m depth) as a followup to the Phoenix lander.

Zacny K. Paulsen G. Davis K. Glass B.
Drilling and Automation for Mars Exploration — 3rd Field Test on Devon Island **[#1765]**
The third Drilling Automation for Mars Exploration field test took place inside the Haughton Crater on Devon Island in the Canadian High Arctic in July 2006. This season's objective was to demonstrate autonomous drilling capabilities while drilling with a peak power of less than 150 W.

Smythe W. D. Foote M. Johnson E. Daly J. Loges P. Puscasu I. Gorevan S. Chu P. Granahan J.
The Mars Borehole IR Spectrometer **[#2238]**
A report on the implementation and testing of the Mars Borehole IR spectrometer. This spectrometer is designed to fit within a Mars drill, providing near real-time monitoring of the composition of the borehole wall.

Dreyer C. B. Mungas G. S.
Integrated Micro-LIBS, Raman Spectroscopy, and Microscope for Space Exploration **[#2307]**
Micro-LIBS on oolithic hematite samples at <20 μm spot diameter with micro-joule laser pulse energy (<200 microjoule) is investigated to demonstrate the feasibility of incorporating micro-LIBS in the Raman/CHAMP instrument.

Sharma S. K. Misra A. K. Lucey P. G. Wiens R. C. Clegg S. M.
Combined Remote LIBS and Raman Spectroscopy of Minerals Using a Single Laser Source **[#1208]**
This work explores the use of a single pulsed laser operating at dual wavelengths of 1064 and 532 nm for exciting both remote Raman and LIBS spectra of minerals by adjusting the laser power electronically.

Corrigan C. M. Brinckerhoff W. B. Cornish T. Ganesan A. Ecelberger S.
In-Situ Laser Desorption Mass Spectrometer Development Guided by Planetary Analog Sample Analysis **[#1475]**
We present progress on the development of a miniaturized laser desorption mass spectrometer and discuss the results of analyses of planetary analogs by comparable laboratory instrumentation.

Buehler M. G. Anderson R. C. Chen K. B. Seshadri S. Keymeulen D.
Using Impedance Spectroscopy to Measure Water/Ice Content of Simulated Martian Soils **[#1250]**
The electrical conductivity of coarse silica sand is $\sigma(S/cm = 8\times10^{-11} + 2.7\times10^{-5}\bullet C^*(M)\bullet[\theta_g(wt.\%)]^{1.8}$ where C* concentration of ions in solution or defects in ice and θ_g is the water/ice content with a detection limit of > 0.05 wt.% water and > 0.5 wt.% ice.

Dreyer C. B. Mungas G. S.
Development Progress of Pulsed Cavity Ringdown Laser Absorption Spectroscopy in a Hollow Waveguide for Trace Gas Detection **[#2369]**
We present progress on the development of the hollow waveguide pulsed cavity ringdown spectroscopy instrument for trace gas detection. An experiment using a waveguide at 1.66 μm for trace methane detection is in development.

Urgiles E. Wilcox J. Z. Toda R. Crisp J.
Progress in the Development of the Atmospheric Electron-induced X-Ray Spectrometer (AEXS) Instrument **[#1181]**
The progress in the development of AEXS and the results of the determination of mapping surface elemental composition of inhomogeneous samples with 1 mm spatial resolution are described.

Kitts K. Sutton S. Newville M.
A New In Situ Method of Determining Relative Abundances and Charge States of Implanted Transition Metals in Individual Grains Using Synchrotron X-Ray Fluorescence **[#1128]**
We report on a new *in situ* method of determining relative abundances and charge states of implanted transition metals in individual grains using synchrotron X-ray fluorescence.

Ogawa K. Okada T. Kato M.
A Portable Miniaturized X-Ray Tube for In-Situ Geological Analyses **[#1302]**
A miniaturized X-ray tube specialized for *in situ* geological and petrological X-ray analyses of lunar rocks and powder samples is being developed. We report the current status of the developments.

Austin D. E. Manning H. L. K. Beauchamp J. L.
A Miniature Mass Spectrometer for High-Flux Cosmic Dust Analysis **[#1099]**
We designed a novel mass spectrometer for *in situ* characterization of micro-particulates in regions of high concentration, such as a comet fly-by, planetary ring, or impact-generated plume. This device is based on novel ion optics that allow high performance on a small instrument.

Kozyrev A. S. Gurvitz L. I. Litvak M. L. Mitrofanov I. G. Rogozhin A. A. Sanin A. B. Schulz R. Schvetsov V. N. Tretyakov V. I.
Gamma-Ray and Neutron Spectrometers for Exploration of Mercury and Fobos On-Board BepiColombo and Fobos-Grunt Missions **[#1589]**
This abstract contains details about two similar neutron and gamma spectrometers selected for BepiColombo and Fobos-Grunt planetary missions.

Starr R. D. Evans L. G. Parsons A. M. Trombka J. I. Groves J. Akkurt H. Floyd S. R. Namkung M. Perkins L. Wraight P. Ziegler W. Schweitzer J.
Combined Gamma-Ray Spectrometer and Pulsed Neutron Generator System for In-Situ Planetary Geochemical Analysis **[#1919]**
A combined pulsed neutron/gamma-ray system can be used on planetary surfaces to provide valuable geochemical analysis of surface materials to depths of ~1 m. We describe experimental results that demonstrate the capabilities of such a system.

Bearman G. H. Johnson W. R. Fink W. Wilson D. W.
An Intelligently Reconfigurable Snapshot Imaging Spectrometer for Planetary Exploration **[#1103]**
We report a snapshot imaging spectrometer with a smart option which can dynamically reconfigure the spectral resolution from 50 bands to 300 bands. Lower spectral resolution is used for target identification and prioritization with the higher mode for increased science and target discrimination.

Fink W. Mahaney W. C. Kuhlman K. R.
Adapter-based Microscopic and Wide-Angle Imaging Capability for Digital Cameras for Planetary Exploration and Astrobiology **[#2397]**
An adapter-based microscopic and wide-angle imaging capability for digital cameras is introduced. A prototype currently achieves a resolution of about 5 μm per pixel with optical zoom and about 1.2 μm with additional digital zoom across a 5 MP image.

Nikzad S. Jones T. J. Hoenk M. E.
Curved Focal Plane Arrays for Compact, Wide Field of View Optical Systems **[#2436]**
We present two approaches for making curved focal plane arrays that reduce the optical complexity of instruments by substantially reducing the number of optical elements required.

Manohara H. M. Bronikowski M. J. Wong E. W. Toda R. Lin R. H. Luong E. M. Wilcox J. Z.
Carbon Nanotube-based Vacuum and Semiconducting Devices for Micro-Instrumentation and Electronics **[#1436]**
This work describes the development of high current density carbon nanotube field emitters and nanotube electronics for advanced planetary *in situ* intrumentation for X-ray, mass, and THz spectroscopies.

Biswas S. Stamatakos J. Grimm R. Hood L.
Magnetic Anomaly Analysis to Determine Parameter Space for an Airborne Magnetometer on Mars **[#1021]**
Martian magnetic anomalies observed by MGS from 150–400 km altitudes have relatively low resolution. Higher resolution magnetic anomaly observations from airborne platforms (2–8 km altitudes) could lead to better characterization of martian sources.

Ciarletti V. Le Gall A. Berthelier J. J. Corbel Ch. Dolon F. Ney R. Reineix A. Guiffaud Ch. Clifford S. Heggy E.
Bi-Static Deep Electromagnetic Soundings for Martian Subsurface Characterization: Experimental Validation in the Egyptian Western Desert **[#1838]**
A bi-static version of the HF GPR TAPIR developed for martian deep soundings has been operated in the Egyptian Western Desert. The study presented focuses on the retrieval of the direction of arrival of the observed echoes on both simulated and measured data.