EP 6 Poster

Zeit: Dienstag 14:00–16:30 Raum: C

EP 6.1 Di 14:00 C

Non-destructive Trace Element Analysis of Presolar Stardust via XANES-PEEM — •Thomas Berg[1], Pasqual Bernhard[1], Jochen Maul[1], Nicole Erdmann[2], Christa Sudek[3], Ulrich Ott[3], and Gerd Schönhense[1] — [1]Universität Mainz, Institut für Physik, D-55099 Mainz — [2]Universität Mainz, Institut für Kernchemie, D-55099 Mainz — [3]Max-Planck-Institut für Chemie, D-55128 Mainz

Meteorites contain small amounts of presolar dust that survived the formation of the solar system without being affected by the isotope homogenisation. Therefore the isotopic composition not only of the bulk elements, but also of trace elements(1) is anomalous. Isotopic analysis via SIMS(2) / RIMS(3) often reveals the fingerprint of the nucleosynthetic s-processes that occurred in the grain's origin star. The disadvantage of SIMS / RIMS, however, is that only a small number of isotopes can be investigated, because the sample grain is being destroyed. We present non-destructive synchrotron based XANES measurements using PEEM. Prior to isotopic analysis this technique is suitable for identification of interesting trace elements present in single stardust grains. In addition, XANES-PEEM provides information on the chemical environment in which the different elements occur within the particles. Supplementing TOF-SIMS measurements(4) confirming the XANES-PEEM results are also presented.

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(2)K.K.Marhas,P.Hoppe,U.Ott,Meteorit.Planet.Sci.38(2003)A58
(3)M.R.Savina et al.,Geochim.Cosmichim.Acta67(2003)3201
(4)T.Stephan,Planetary Space Sci.49(2001)859

EP 6.2 Di 14:00 C

Rosetta Radio Science Investigations (RSI) — •Silvia Tellmann[1], Martin Pätzold[1], Bernd Häusler[2] und RSI Team[1,2] — [1]Institut für Geophysik und Meteorologie, Universität zu Köln, Köln, Deutschland — [2]Institut für Raumfahrttechnik, Universität der Bundeswehr München, Neubiberg

Die im März 2004 gestartete ESA-Raumsonde ROSETTA ist die erste Mission, deren Ziel es ist, einen Kometen über einen längeren Zeitraum hinweg zu beobachten und sogar auf dessen Kometenkern mit einem Landegerät zu landen. Das Radio Science Investigations Experiment (RSI) benutzt für seine Messungen einen an Bord befindlichen Ultrastabilen Oszillator (USO) und das Radiosubsystem der Raumsonde, um fundamentale Aspekte der Kometenphysik zu untersuchen. Neben der Masse und Dichte des Kerns sollen hierbei auch die niederen Harmonischen des Schwerefeldes und seine dielektrischen Oberflächeneigenschaften bestimmt werden. Darüberhinaus werden Staub- und Gasproduktionsraten sowie der Elektroneninhalt der ionisierten Koma ermittelt. Schließlich soll während eines Vorbeiflugs am Asteroiden Lutetia im Jahr 2010 dessen Masse und Dichte bestimmt werden.

Die ersten Ergebnisse der Commissioning-Phase und der regelmässig durchgeführten Messungen zur Stabilität des Oszillators erlauben es, Abschätzungen über die Empfindlichkeit des Experiments und die Alterung der Stabilität des Oszillators im Vergleich zu ebenfalls unternommenen kohärenten Zweiweg-Experimenten zu treffen.

EP 6.3 Di 14:00 C

A Trajectory Sensor for Space Dust — •Eberhard Grün[1], Ralf Srama[2], Andre Srowig[3], Sascha Kempf[2], Georg Moragas-Klostermeyer[2], Siegfried Auer[4], and Stefan Helfert[2] — [1]MPI-Kernphysik, Heidelberg, Ger; HIGP, Univ. Honolulu, USA — [2]MPI-Kernphysik, Heidelberg, Germany — [3]KIP Heidelberg, Germany — [4]A&M Assoc., Basye, USA

Dust particles' trajectories are determined by the measurement of the electric signals that are induced when a charged grain flies through a position sensitive electrode system. The goal of the trajectory sensor is to measure dust charges in the range 10ˆ-16 to 10ˆ-13 C and dust speeds in the range 6 to 100 km/s. The trajectory sensor has four sensor planes consisting of about 15 wire electrodes each. Two adjacent planes have orthogonal wire direction. An ASIC charge sensitive amplifier has been developed with a RMS noise of about 1.5 10ˆ-17 C. The signals from 32 electrodes are digitized and sampled at 20 MHz rate by an ASIC transient recorder. This trajectory sensor was subject to performance tests at the Heidelberg dust accelerator. Signals from dust particles in the speed range from 5 to 30 km/s demonstrate that trajectories can be measured with accuracies of ˜1 deg. in direction, and ˜1% in speed.

EP 6.4 Di 14:00 C

A NEW LARGE AREA TOF MASS SPECTROMETER — •Ralf Srama[1], Michael Rachev[2], Stefan Helfert[3], Sascha Kempf[1], Georg Moragas-Klostermeyer[1], Anna Mocker[1], Frank Postberg[1], and Eberhard Grün[1] — [1]MPI-Kernphysik, Heidelberg, Germany — [2]CALTECH, Pasdena, USA — [3]Helfert Informatik, Mannheim, Germany

Based on experience with current space dust instruments on-board interplanetary missions, a novel Dust Telescope is being developed. A dust telescope is a combination of a dust trajectory sensor and a mass analyzer. The trajectory sensor is used to determine the speed, mass and trajectory of interplanetary and interstellar dust grains. In contrast, the mass analyzer provides the elemental composition of individual grains. Here, we report about the successful tests of the large area mass analyzer (LAMA) at the dust accelerator of the Max Planck Institute for Nuclear Physics in Heidelberg.

EP 6.5 Di 14:00 C

COSTEP/SOHO observations of energetic electrons far upstream of the Earth's bow–shock — •Andreas Klassen, Raul Gomez-Herrero, Eckart Böhm, Reinhold Müller-Mellin, Bernd Heber, and Robert Wimmer-Schweingruber — Institut für Experimentelle und Angewandte Physik, Universität Kiel

We have analyzed 54 electron bursts at energies above 0.25 MeV observed with the COSTEP/EPHIN instrument onboard the SOHO spacecraft far upstream of the Earth's bow shock. Some of these upstream bursts were accompanied by energetic protons (< 1 MeV). Most of the bursts were observed during low solar activity (in 1996–1997 and in 2005) and were not associated with solar particle events.

A close correspondence between the event rate and enhancements in both solar wind speed (V_{sw}) and geomagnetic activity index (A_p) indicates that the observed events can be explained in terms of leakage of magnetospheric particles during enhanced geoactivity rather than acceleration at the Earth's bow shock. We compare these data with measurements of particle bursts as well as magnetic field and solar wind parameters obtained with the Wind spacecraft.

EP 6.6 Di 14:00 C

From Sun to Earth: The January 20, 2005 Space Weather Event — •Christian T. Steigies, Andreas Klassen, Karin Bamert, and Robert F. Wimmer-Schweingruber — IEAP, Christian-Albrechts-Universität zu Kiel

We discuss the January 20, 2005, space weather event using data from particle instruments on SOHO and ACE, as well as Earth-based neutron monitors. The worldwide network of neutron monitors constantly measures cosmic rays that hit the earth. Neutron Monitors can measure particles with energies far beyond the range of space based instruments. Using data from NM stations with different geomagnetic cut-offs, a spectrum of a particle event can be derived. The combination of these ground based measurements with satellite observations can provide new insights into transport and acceleration processes in the solar system.

EP 6.7 Di 14:00 C

Ion Acceleration and Wave-Particle Interaction at the Interplanetary Shocks Associated with the Halloween 2003 and the 20 January 2005 Events: SOHO/HSTOF, SOHO/EPHIN, and ACE/MAG Observations — •Karin Bamert[1], Robert F. Wimmer-Schweingruber[1], Reinald Kallenbach[2], Martin Hilchenbach[3], Bernd Heber[1], Reinhold Müller-Mellin[1], Andreas Klassen[1], and Charles W. Smith[4] — [1]Institut für Experimentelle und Angewandte Physik, University of Kiel, Leibnizstrasse 11, 24098 Kiel — [2]International Space Science Institute, Hallerstrasse 6, CH-3012 Bern, Schweiz — [3]Max-Planck-Institut für Sonnensystemforschung, Max-Planck-Strasse 2, 37191 Katlenburg-Lindau — [4]Dept. of Physics and Space Science Center, 39 College Road , Durham, NH 03824, USA

We analyze suprathermal and energetic ions associated with three large coronal mass ejection events during the two most active time periods in the declining phase of this solar cycle. The CMEs and associated flares were observed on Nov. 2 and Nov. 4, 2003 (Halloween events) and on January 20, 2005, by SOHO/LASCO and SOHO/EIT. The second event was accompanied by the largest flare (X28) ever observed. In particular, we focus our study on the upstream regions of the interplanetary shocks driven by these CMEs. By combining data of HSTOF and EPHIN we are able to analyze the ions in a large energy range. We compare these results to those associated with the Bastille Day event in 2000, and discuss them in the context of models based of quasi-linear theory of ion acceleration and wave-particle interaction at interplanetary traveling shocks.

EP 6.8 Di 14:00 C

The November 1, 2004 Solar Energetic Particle Event: SOHO/COSTEP observations — •R. Gómez-Herrero, A. Klassen, R. Müller-Mellin, B. Heber, and R. Wimmer-Schweingruber — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität Kiel, Ohlshausenstr. 40, 24118 Kiel

On November 1, 2004 a 925 km/s partial halo Coronal Mass Ejection (CME) was observed over the west solar limb by LASCO C2 coronagraph on board SOHO. In association with this CME, a solar energetic particle event was detected by the COSTEP/EPHIN instrument. Disk observations and the lack of X-ray flare on the visible hemisphere of the Sun suggest that the source of the event was located on the backside of the Sun, probably in the NOAA active region 10684, more than 30 degrees beyond the west limb. Energetic proton and 4He spectra observed by EPHIN became invariant during the decay phase of the event. The low 4He/1H ratio observed during the event, together with the spectral invariance and the association with a fast CME, are signatures normally found on shock-associated (gradual) events. However they were also accompanied by a moderate 3He enrichment, which was probably related to a 3He-rich seed population provided by the previous intense 3He-rich events starting on October 30. Observational features and possible scenarios to explain particle propagation from the backside source to the near-Earth environment are proposed and discussed.

EP 6.9 Di 14:00 C

CLUSTER spacecraft observations of current sheets at the Earth*s magnetopause — •E.V. Panov[1,2], J. Büchner[1], M. Fränz[1], A. Korth[1], K.-H. Fornaçon[3], I. Dandouras[4], and H. Rème[4] — [1]Max-Planck-Institut für Sonnensystemforschung, Max-Planck-Straße 2, 37191 Katlenburg-Lindau, Germany — [2]Space Research Institute of RAS, 84/32 Profsoyuznaya Street, 117997 Moscow, Russia — [3]Institut für Geophysik und Meteorologie, TU Braunschweig, Mendelssohnstraße 3, 38106, Braunschweig, Germany — [4]Centre d'Etude Spatiale des Rayonnements, CESR BP 4346, 31028 Toulouse Cedex 4, France

The magnetopause is the outer border of the magnetosphere. It is responsible for mass and energy transfer of the shocked solar wind into the magnetosphere. The transfer rates can be increased by, e.g., diffusion due to the resonant wave-particle interaction. With the help of the four CLUSTER spacecraft we investigate the properties of wave turbulence and estimate the possible diffusion rates for magnetopause sheets with different thicknesses.

EP 6.10 Di 14:00 C

Interaction between Hot Jupiters and their central stars — •Sabine Preusse[1], Andreas Kopp[2], Jörg Büchner[1], and Uwe Motschmann[3] — [1]Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau — [2]Theoretische Physik IV, Ruhr-Universität Bochum, 44780 Bochum — [3]Institut für Theoretische Physik, TU Braunschweig, Mendelssohnstraße 3, 38106 Braunschweig

A decade ago the first extrasolar planets around main sequence stars were detected. A surprising feature was the great number of planets very close (< 0.06 AU) to their stars. If their mass is comparable to that of Jupiter they are called "Hot Jupiters". Such a closeness of planet and central body does not occur for Solar systems planets but for planetary satellites. For these a strong interaction with their planet can be observed. Possibly the most remarkable and best understood example is Io interacting with Jupiter. Therefore, close-in extrasolar planetary systems are often considered to be scaled up versions of Io (the extrasolar planet) and Jupiter (the central star). This is one of the interaction scenarios for Hot Jupiters and their central stars which we study on the basis of realistic stellar wind models by numerical simulations in the frame of resistive magnetohydrodynamics (MHD).

EP 6.11 Di 14:00 C

Ein Multifluidmodell für staubige Plasmen — •Andreas Kopp — Theoretische Physik IV, Ruhr-Universität Bochum, 44780 Bochum

Es wird ein Satz von Gleichungen präsentiert, der staubige Plasmen im Rahmen eines für numerische Simulationen geeigneten Multifluid-Bildes beschreibt. Er besteht aus den Gleichungen für Teilchendichte, Flußdichte und thermische Energie für jede Teilchensorte, sowie das Faraday'sche Gesetz für das Magnetfeld. Das Plasma besteht aus Elektronen, verschiedenen Ionen- und Neutralgassorten und Staub. Zu den Wechselwirkungstermen zählen Ionisation und Rekombination, elastische und reaktive Stöße, sowie Ladungsaustausch. Die Annahmen, die zur Ableitung des Systems nötig sind, sind die Quasineutralität und die Tatsache, daß die Elektronen als trägheitslos angenommen werden können. Ein neuer Punkt ist, daß Staubmasse und -ladung in Ort und Zeit variieren dürfen, so daß zwei weitere Gleichungen hinzukommen. Im Hinblick auf Anwendungen auf das interstellare Medium (ISM) wurden auch die speziellen Wechselwirkungsterme zwischen dem Staub und den übrigen Species berücksichtigt.

EP 6.12 Di 14:00 C

Charging of dust grains within Saturn's magnetosphere — •Uwe Beckmann[1], Sascha Kempf[1], Ralf Srama[1], Georg Moragas-Klostermeyer[1], Stefan Helfert[1], and Eberhard Grün[1,2] — [1]MPI für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg — [2]University of Hawaii, 1680 East West Road POST 512c, Honolulu, HI 96822, USA

Saturn's huge E ring is composed of submicron grains and extends from three to at least nine Saturnian radii (Saturnian radius R_S = 60330km). Since the ring particles are exposed to an ambient plasma the particles rapidly get charged up. Knowing the electrostatic potentials of the grains is important to describe the interaction of the charged grains with Saturn's strong magnetic field correctly.

Since July 2004, the Cassini spacecraft orbits Saturn, and traversed several times through the E ring. The Cosmic Dust Analyser (CDA) onboard of the spacecraft allows to measure the charge simultaneously with the mass and speed of the grains what in turn allows to determine the corresponding electrostatic potentials.

Here we present a comparison of grain potentials based on in-situ measurements with model calculations of the grain charging within the E ring based on the most recent plasma data. Our results suggest that the CDA mass calibration is applicable for the ring particles.

EP 6.13 Di 14:00 C

New observations of Phobos, Deimos, and their shadows with the HRSC/SRC on Mars Express — •Jürgen Oberst[1], Klaus-Dieter Matz[1], Thomas Roatsch[1], Bernd Giese[1], Harald Hoffmann[1], and Gerhard Neukum[2] — [1]German Aerospace Center, Berlin — [2]Freie Universität Berlin

In the past year, many new observations of Phobos and Deimos have been carried out by the HRSC (High Resolution Stereo Camera) and the SRC (Super Resolution Channel) on the Mars Express spacecraft. A total of 3 Phobos flyby maneuvers were executed within one November week (2005) alone. In addition, the Phobos shadow was captured twice, in orbits 2239 and 2345, as it moved across the surface. As we reported previously, the earlier observations were used to determine the astrometric positions of the two satellites with accuracies of 0.5 - 5 km (Phobos) and 1.0 km (Deimos). These positional data differed substantially from the various available predictions, a fact which motivated the beginning of renewed Phobos and Deimos orbit modeling efforts. On the observational side, efforts were made to refine the astrometric measurements: for the HRSC observations carried out in the second half of this year, the planning software was upgraded, to maximize the number of background stars in the images for improved camera pointing control. The new data can be used to confirm and further improve the accuracy of the satellite orbit models. These models bear important implications on tidal dissipation and internal structure of Mars.

EP 6.14 Di 14:00 C

Kombination planetarer Datensätze mit Hilfe geographischer Informationssysteme am Beispiel Mars — •Peter Saiger[1], Ralf Jaumann[1] und Gerhard Neukum[2] — [1]Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Standort Berlin-Adlershof, Institut für Planetenforschung, Abteilung Planetengeologie — [2]Freie Universität Berlin, Institut für Geologische Wissenschaften, Fachrichtung Geoinformatik und Planetologie

Geographische Informationssysteme (GIS) sind unerlässliche Werkzeuge zur Integration und Kombination verschiedener geographischer Datensätze, wie Bilder, spektraler Daten oder digitaler Geländemodelle, welche in unterschiedlicher Form, wie beispielsweise im ASCII-, Raster- oder Vektorformat vorliegen. Bevor diese Daten zur Analyse und Weiterverarbeitung herangezogen werden können, müssen diese entsprechend auf- oder vorbereitet werden. Zudem muss ein einheitliches Referenzsystem für alle Daten vorhanden sein. In diesem Beitrag wird beschrieben, wie mittels ArcGIS 9 von ESRI unterschiedliche planetare Datensätze des Mars kombiniert werden. Zu diesen zählen Bilder der HRSC (High Resolution Stereo Camera) der ESA Mars Express Mission, MOLA (Mars Orbiter Laser Altimeter), MDIM2.1 (Mars Digital Image Mosaic), MOC (Mars Orbiter Camera), TES (Thermal Emission Spectrometer) sowie die USGS (US Geologic Survey) Geologic Map of Mars. Sind diese Daten im GIS georeferenziert, lassen sich unterschiedliche Analysen durchführen, die ArcGIS anbietet. Zudem besteht die Möglichkeit, die von ArcGIS angebotenen Programmierschnittstellen zu nutzen, um die vorhandenen Analysemethoden mit eigenen Methoden zu kombinieren.

EP 6.15 Di 14:00 C

Untersuchung zur bevorzugten Hangexposition von Erosionsrinnen in den nördlichen Tiefebenen des Mars mit HRSC-Daten
— •Thomas Kneissl[1], Dennis Reiss[1], Ralf Jaumann[1] und Gerhard Neukum [2] — [1]DLR, Standort Berlin-Adlershof, Institut für Planetenforschung, Abteilung Planetengeologie — [2]FU Berlin, Institut für Geologische Wissenschaften, Fachrichtung Geoinformatik und Planetologie

Flüssiges Wasser ist eine der Hauptvoraussetzungen für die Bildung von sehr jungen Erosionsrinnen (engl.: gullies) auf dem Mars. Die heutigen klimatischen Bedingungen lassen jedoch kaum flüssiges Wasser zu. Ihre Untersuchung ist deshalb wichtig für das Verständnis der jüngsten Klimavergangenheit des Planeten. In den nördlichen Tiefebenen treten Gullies aufgrund der geringen Reliefenergie überwiegend an den Hängen von größeren Einschlagskratern auf. Die in diesem Gebiet sehr flächendeckend vorhandenen Daten der High Resolution Stereo Camera (HRSC) decken hierbei meist die gesamte Ausdehnung dieser Krater ab und ermöglichen durch Auflösungen bis ca. 12 m/pixel dennoch die Identifikation der Gullies. Das durch die Kraterform bedingte, ausgewogene Verhältnis der Azimute der aufgenommen Hänge ermöglicht es, die Exposition der Gullies repräsentativ zu bestimmen. In 68 der insgesamt 230 nördlich von 30° Nord ausgewerteten HRSC-Orbits sind Gullies identifiziert worden. Die bevorzugte Exposition der ca. 2400 einzelnen Gullies war hierbei Südosten. Dies deutet im Zusammenhang mit der geographischen Breite auf einen Einfluss der Insolation während des Bildungsprozesses der Gullies hin.