EP 7: Poster Session Extraterrestrics

Zeit: Dienstag 17:30–19:00 Raum: Foyer der Zahnklinik

EP 7.1 Di 17:30 Foyer der Zahnklinik

Dosis Messungen an Bord der ISS — •Johannes Labrenz[1], Sönke Burmeister[1], Thomas Berger[2], Günther Reitz[2], Rudolf Beaujean[1] und Bernd Heber[1] — [1]CAU Kiel — [2]DLR Köln

MATROSHKA ist ein Experiment unter Leitung des DLR-Köln zur Bestimmung der Strahlenexposition des Menschen im Weltraum. Mit Hilfe von aktiven und passiven Detektoren wird die Strahlenexposition in einem dem Menschen nachgebildeten Phantom bestimmt. Die Messung der Strahlung erfolgt u.a. durch das aktive DOSimetry TEL escope (DOSTEL) der CAU Kiel. DOSTEL ist ein Detektorsystem bestehend aus zwei Si-Halbleiterdetektoren zur Messung ionisierender Strahlung. Bei der Messung wird die im Detektor pro Wegstrecke deponierte Energie (Linear Energy Transfer LET) als Maß für die Strahlenexposition gemessen. Seit Januar 2004 befindet sich das MATROSHKA-Experiment an Bord der ISS. In einer ersten Phase wurde die Strahlenexposition außerhalb der Raumstation im Zeitraum von Februar 2004 bis August 2005 bestimmt (MATROSHKA 1). Seit Mai 2008 läuft eine weitere Expositionsphase unter Einbeziehung der aktiven Instrumente (MATROSHKA 2 Phase B) innerhalb der Raumstation. In diesem Beitrag wird ein Verfahren zur Zeitsynchronisation von Zählratenmessungen im erdnahen Orbit mit Hilfe der Beziehung zwischen Zählraten und geomagnetischer Breite vorgestellt. Außerdem werden Zählraten und Dosiswerte der beiden Experimentphasen präsentiert und verglichen.

EP 7.2 Di 17:30 Foyer der Zahnklinik

Ion Upwelling Associated with Ionospheric Heating — •Michael Danielides[1], Mike Kosch[2], and Michael Rietveld[3] — [1]IABG mbH, Einsteinstrasse 20, 85521 Ottobrunn, Germany — [2]Lancaster University, Lancaster, LA1 4WA, UK — [3]EISCAT Scientific Association, Ramfjordmoen, 9027 Ramfjordbotn, Norway

The mechanism for ion outflow from the auroral ionosphere into the magnetosphere is one of the fundamental open problems of space physics. It is widely accepted that this process is a multi-step process. In the first step ionospheric and thermospheric mechanisms provide an upwelling of oxygen and other heavy ions to higher than usual altitudes. These ions then constitute the seed population for the active acceleration mechanisms such as localized electric fields or inertial forces. Both of these steps are currently not understood.

The aim of the present study is an investigation and qualification of possible mechanisms which cause the ion upwelling. At first the ion upwelling is identified as a response to artificial ionospheric heating. Then a comparison of by incoherent scatter radar observed ion upflow characteristics (upward velocity, particle flux, temporal evolution) with numerical modeling of the heating and upward acceleration processes is performed. For this purpose we use data collected within the framework of an UK EISCAT high frequency ionospheric heating campaign from September til December 2007 at the EISCAT facility in Norway. The simulations are based on an advanced two-dimensional three fluid MHD model for small scale thermospheric and ionspheric processes.

EP 7.3 Di 17:30 Foyer der Zahnklinik

Bridging Eulerian and Lagrangian fluctuations — •Christian Schwarz[1], Christoph Beetz[1], Oliver Kamps[2], Rudolf Friedrich[2], Jürgen Dreher[1], and Rainer Grauer[1] — [1]Theoretische Physik I, Ruhr-Universität Bochum, Germany — [2]Theoretische Physik, Universität Münster, Germany

Compressible turbulent flows as they occur in the interplanetary medium may be looked at from two different points of view: the Eulerian and the Lagrangian. Understanding the relation between Eulerian and Lagrangian statistics is still an open problem since the most singular structures in turbulence like vortex tubes, current sheets and shocks have a very different impact on Eulerian and Lagrangian PDFs. Based on DNS of compressible Navier-Stokes turbulence, we propose a mapping between the two statistics with two transitional probabilities. The first describes the transition to a semi-Lagrangian equal-time statistics whereas the second has the character of an exit time statistical quantity. If one models the transitional PDFs with delta-functions, an analytical expression for the structure function exponents could be obtained by making use of the Mellin transform. Comparison of the exponents with those obtained from numerical simulations reveals that the modeling must contain a time-lag dependent change of the variance of the transition probabilities.

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EISCAT (ESR) and SOUSY (SSR) Svalbard Radar Observations of PMSE - Revisited - Differences, Similarities and Capabilities — •Jürgen Röttger — EISCAT-CAWSES-Copernicus and Max-Planck-Institute, 37191 Katlenburg-Lindau, Germany

The EISCAT Svalbard Radar (ESR) operates on 500 MHz; collocated (at a distance of 1.5 km) with it is the SOUSY Svalbard Radar (SSR), which operates on 53.5 MHz. We revisit earlier analyses of the summer mesosphere to show the capabilities when both radars are used. This is during PMSE coherent scatter conditions, where the ESR can also detect incoherent scatter and thus allows to estimate the electron density. We revisit and highlight observations of incoherent and coherent scatter and draw potential interpretations which had been casted earlier.

EP 7.5 Di 17:30 Foyer der Zahnklinik

On the Possibility of Upper Mesosphere Temperature Changes Observed in PMSE and Incoherent Scatter During a Strong Polar Cap Absorption Event - Revisited - — •Jürgen Röttger — EISCAT-CAWSES-Copernicus and Max-Planck-Institute, 37191 Katlenburg-Lindau, Germany

Middle of July 2000 an extremly strong solar proton event happened (named "Bastille II"), which caused major polar cap absorption (PCA) due to the strong increase of D-region electron density by high energy particle precipitation. The concurrent ionospheric disturbances led to enhanced electric fields, which caused an increase of the ion drift and the neutral wind in the lower thermosphere and possibly the upper mesosphere as well. Through the enhanced ion drag, increases of ion and neutral temperature are usually resulting, which are also known as Joule heating. It is revisted here how it was tried to recognize this in coherent scatter observations of PMSE with the SOUSY Svalbard Radar (SSR on 53.5 MHz) and observations of incoherent scatter with the EISCAT Svalbard Radar (ESR on 500 MHz). We find two independent observations, which indicate a potential small temperature increase of the upper mesopause region, which can be due to ion heating.

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Validation of PLANETOCOSMICs predictions with EISCAT electron precipitation measurements — •Renate Scherer[1], Klaudia Herbst[2], Mike Rietveld[3], Bernd Heber[2], and Klaus Scherer[4] — [1]EISCAT-CAWSES-Copernicus, 37191 Katlenburg-Lindau, Germany — [2]Institut für Experimentelle und Angewandte Physik, CAU, 24118 Kiel — [3]EISCAT, Tromsø, Norway — [4]Theoretische Physik Lehrstuhl IV, RUB, 44780 Bochum

Because cosmic rays affect the production of cosmogenic isotopes and possibly the climate, we want to validate the predictions of our PLANETOCOSMIC program concerning the ion-pair production. The PLANETOCOSMICS code is a Monte-Carlo based program which estimates the hadronic interaction of cosmic rays in the atmosphere and its electron production rate. The latter outcome can then be related to the electron density measurements at EISCAT, where an additional modelling is required to calculate the electron density from the electron production rate. We present here our first results concerning the observations and modelling with PLANETOCOSMICS.

EP 7.7 Di 17:30 Foyer der Zahnklinik

A search for long-term variations of the F layer using EISCAT — •Renate Scherer[1], Mike Rietveld[2], Klaus Scherer[3], Bernd Heber[4], and Horst Fichtner[3] — [1]EISCAT-CAWSES-Copernicus, 37191 Katlenburg-Lindau, Germany — [2]EISCAT, Tromsø, Norway — [3]Theoretische Physik Lehrstuhl IV, RUB, 44780 Bochum — [4]Institut für Experimentelle und Angewandte Physik, CAU, 24118 Kiel

Some theoretical as well as experimental studies based on ionosonde data suggest that climate change can also affect the upper layer of the ionosphere. Unfortunately, thee are several problems and uncertainties in determining the layer heights from ionosonde data, such that a precise determination of the F-layer height is difficult. With the EISCAT radar the range s measured directly so that the height of the F-layer is obtained with much better precision. Because almost 20 years of ob-

servations exist, we will analyse the long-term behavior of the F-layer based on EISCAT data. We present here our first results based on the EISCAT observations during 2006.

EP 7.8 Di 17:30 Foyer der Zahnklinik

High-frequency magnetospheric sounding at EISCAT: some trials and their implications — Andrew Senior[1], Farideh Honary[1], •Michael Rietveld[2], Peter Chapman[1], and Mike Kosch[1] — [1]Dept. of Communication Systems, Lancaster University, LA1 4WA, U. K. — [2]EISCAT Scientific Association, N-9027 Ramfjordbotn, Norway

The results of some recent experiments employing the EISCAT HF heating facility at Ramfjordmoen, near Tromsø, Norway as a HF radar transmitter are described. The motivation for the experiments was the detection of conjugate echoes caused by geomagnetic field-aligned ducting of the HF wave in the magnetosphere and reflection from the magnetically-conjugate ionosphere. No such echoes were detected during the experiments, which is probably to be expected from consideration of the plasma density gradients required to sustain guidance of the waves at the low HF frequencies involved. However, echoes were obtained at ranges which could be consistent with backscattering from ionospheric irregularities in the equatorial and southern auroral regions; this is similar to spread-Doppler clutter observed by large over-the-horizon radar (OTHR) systems. The technique and results are discussed with a view towards future attempts to sound the lower magnetosphere using high-power HF transmitters. If the coherent echoes associated with aurora observed using the UHF and VHF EISCAT radars also exist at HF, then HF sounding may be a powerful new tool for studies of the aurora.

EP 7.9 Di 17:30 Foyer der Zahnklinik

Charakterisierung eines Dosimeters zur Messung der Ortsdosisleistung in Flughöhen — •Thomas Möller im Namen der RAMONA Kooperation — Universität Kiel/IEAP, 24098 Kiel

Die Erde wird fortwährend einer hochenergetischen Teilchenstrahlung aus dem Weltall ausgesetzt. Als Folge entsteht aus den Sekundärprodukten der kosmischen Strahlung ein natürliches Strahlungsfeld in der Atmosphäre. Dieser relativ niedrigen Strahlenexposition ist das fliegende Personal ausgesetzt. Um dauerhaft die Strahlenexposition weltweit zu messen, werden im Rahmen der Kooperation RAMONA meherere Dosimeter in Passagierflugzeugen eingebaut. Ziel der experimentellen Untersuchungen ist es, die Auswirkung von Sonneneruptionen auf die Ortsdosisleistung in Flughöhen zu bestimmen. Es wird angestrebt, dass sich immer ein Dosimeter in Flughöhen befindet. Eines der Dosimeter ist das NAVIDOS in dem als Detektor, das DOSimetrie-TELeskop DOSTEL eingebaut ist. Das DOSTEL ist bereits mehrfach erfolgreich im erdnahen Weltraum sowie in Verkehrsflugzeugen eingesetzt worden. Es besteht aus zwei planaren Silizium Halbleiterdetektoren, die in Teleskopgeometrie angeordnet sind. Geladene Teilchen werden direkt und ungeladene Teilchen, wie Neutronen und Photonen indirekt gemessen. NAVIDOS wurde in Zusammenarbeit mit der Physikalischen-Technischen Bundesanstalt (PTB) entwickelt. Es wird das verwendete Verfahren zur Kalibrierung im Strahlungsfeld der Erde und deren Ergebnisse gezeigt.

EP 7.10 Di 17:30 Foyer der Zahnklinik

Modeling the Martian neutral particle radiation - predictions for ExoMars/IRAS and implications for Martian habitability during the Noachian — •Bent Ehresmann[1], Robert Wimmer-Schweingruber[1], Soenke Burmeister[1], Jan Koehler[1], Shri Kulkarni[1], and Guenther Reiz[2] — [1]Christian-Albrechts-Universitaet zu Kiel — [2]Deutsches Zentrum für Luft- und Raumfahrt

The exciting results of recent Mars exploration missions indicate that water existed on the Martian surface, which provides a possibility for life on Mars. Thus, there is an enhanced interest in analyzing the conditions for habitability on Mars, especially in the Noachian epoch. An important aspect of habitability is the radiation level of charged and neutral particles in possible habitats. Using Planetocosmics, we calculate particle radiation in the Martian atmosphere and at ground level for present-day conditions. These calculations allow us to make predictions for the measurements of the Ionizing Radiation Sensor (IRAS) on ExoMars. By changing atmosphere conditions and varying the water-content of the Martian soil, we can derive radiation levels expected during the Noachian period. We will discuss the implications of these model results in terms of Noachian habitability.

EP 7.11 Di 17:30 Foyer der Zahnklinik

Light-output response of the scintillators for the Mars Science Laboratory (MSL) Radiation Assessment Detector (RAD) — •Cesar Martin, Eckart Boehm, Onno Kortmann, Stephan Bottcher, Robert F. Wimmer-Schweingruber, Soenke Burmeister, and Bent Ehresmann — Institut für Experimentelle und Angewandte Physik Christian-Albrecht-Universität zu Kiel, Kiel, Germany

The Radiation Assessment Detector (RAD) onboard the NASA's Mars Science Laboratory (MSL) rover mission has been designed to detect a wide range of particle types (charged and neutral) and energies on the Mars surface. The BC432m plastic scintillator coupled to PIN photodiodes has been used as a neutron detector as well as an anticoincidence shield for the RAD instrument. We present an experimental study of the non-linear light-output response of the BC432m for protons and neutrons beams. The experimental results have been compared to the parametric formula based on the theoretical work of Birks and Chou. Furthermore, a comparison between the quenching effect found in the BC432m and in other inorganic scintillators (CsI:Tl) used in the RAD instrument has been performed.

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Detection of neutral particle radiation with the Mars Science Laboratory (MSL) Radiation Assessment Detector (RAD) — •Onno Kortmann[1], Cesar Martin[1], Eckart Böhm[1], Stephan Böttcher[1], Robert F. Wimmer-Schweingruber[1], Sönke Burmeister[1], Bent Ehresmann[1], Donald M. Hassler[2], Cary Zeitlin[2], Arik Posner[3], Arik Posner[4], Scott Rafkin[2], Eddie Weigle[3], Kerry Neal[3], and Günther Reitz[5] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, Leibnizstraße 11, Kiel, 24118 — [2]Southwest Research Institute, 1050 Walnut St., Boulder, CO 80302, United States — [3]Southwest Research Institute, 9503 W Commerce St., San Antonio, TX 78227, United States — [4]NASA-HQ, Heliophysics Division 300 E St. SW, Washington, DC 20546, United States — [5]Deutsches Zentrum für Luft- und Raumfahrt, Aerospace Medicine, Radiation Biology, Linder Höhe, Köln, 51147

RAD, the Radiation Assessment Detector on NASA's Mars Science Laboratory (MSL) rover mission is designed to detect a wide range of different particle species at energies up to 100 MeV/nuc. We present the beam testing results for the flight units of the RAD Sensor Head unit (RSH). Neutral particle response, anti-coincidence efficiency as well as behaviour for relativistic high-Z (up to iron) particles will be shown. Additionally, we present the response of our RSH GEANT4 model for the expected (simulated) Mars surface radiation environment.

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TNS - a light-weight sensor for thermal neutrons — •Jan Koehler[1], Robert F. Wimmer-Schweingruber[1], Eileen Gonzales[2], Bernd Heber[1], Stephan Boettcher[1], Soenke Burmeister[1], Lars Seimetz[1], and Bjoern Schuster[1] — [1]Christian-Albrecht-Universitaet zu Kiel, Germany — [2]Michigan State University

Future solar-system exploration missions will have an increasing focus on the habitability of the moon or planet under investigation. A key aspect of habitability is the availability of water which can be detected by observing signatures of thermal and epi-thermal neutrons. State-of-the-art instruments which detect thermal and epi-thermal neutrons are normally heavy and consume substantial spacecraft resources. Therefore, there is substantial interest in developing small, light-weight instruments with a high detection efficiency. We are currently investigating an innovative detector design based on solid-state detectors and will present initial results.

EP 7.14 Di 17:30 Foyer der Zahnklinik

Inductive response of Callisto's interior — •Mario Seufert and Joachim Saur — Institut für Geophysik und Meteorologie, Universität zu Köln, Deutschland

Callisto, one of the four large Galilean moons of Jupiter, is expected to have a subsurface ocean. Zimmer et al. [2000] showed, that the magnetic field measurements by the Galileo spacecraft can be explained by the inductive response of a two layer interior model of Callisto including a global conductive water shell. For this model the induction inside the moon occurs due to the variation of the Jovian background field by its rotational period and axis tilt. We present an extended model that includes a third layer and a secondary excitation period due to the eccentricity of Callisto's orbit. With this work we will be able to explain the magnetic field measured by the Galileo spacecraft

in greater detail and expect to further constrain the properties of the anticipated ocean.

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MHD-Simulationen des Massloadings von Enceladus mit Hilfe von Yin-Yang-Gittern — Maria Laukert[1], •Andreas Kopp[2,1] und Horst Fichtner[1] — [1]Theoretische Physik IV, Ruhr-Universität Bochum, 44780 Bochum — [2]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, 24118 Kiel

Für numerische Simulationen großskaliger Prozesse auf der Sonne oder in der Umgebung planetarer Körper liegt es nahe, aufwendige Formulierungen zur Realisierung der Oberfläche durch die Verwendung sphärischer Polarkoordinaten zu vermeiden. Man erkauft sich diese offensichtlichen Vorteile jedoch mit an den Polen divergierenden Skalenfaktoren, so dass hier geeignete Mittelungs- oder Näherungsverfahren gefunden werden müssen. Ein Beispiel, das beide Nachteile miteinander vereint, ist der Saturnmond Enceladus mit seinen am Südpol lokalisierten Geysiren, die eine wesentliche Quelle für den E-Ring des Saturn darstellen. Einen Ausweg verspricht die vor allem aus der Meteorologie bekannte Zerlegung der Kugeloberfläche in zwei identische, aber gegeneinander verdrehte Teilgitter. Diese an einen Tennisball erinnernden "Yin-Yang-Gitter" versprechen zwar eine problemlose Behandlung der Oberfläche und der Pole, erfordern aber Transformation und Kopplungen zwischen den beiden Teilgitten Yin und Yang. In diesem Beitrag stellen wir einen neuartigen, resistiven MHD-Code in sphärischer Geometrie unter Verwendung von um eine radiale Komponente erweiterten Ying-Yang Gittern vor und zeigen erste Ergebnisse von Simulationen zur Wechselwirkung von Enceladus mit der Saturn-Magnetosphäre.

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Development of an residual gas monitor for the Kiel solar wind and suprathermal particle laboratory — •Viktor Hrkac, Michael Stalder, Lauri Panitzsch, Robter F. Wimmer-Schweingruber, Christiane Helmke, and Stefan Kolbe — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel

The extraterrestrial physics division of the Institut für Experimentelle und Angewandte Physik in Kiel is developing a solar wind and suprathermal particle calibration facility. It includes an advanced Electron Cyclotron Resonance Ion Source (ECRIS), which generates a well-defined highly charged ion beam dimensioned for an energy range of up to 450 keV/q. This will allow the calibration of space instruments and research on space weathering of dust particles and regoliths, and on fundamental plasma physics. Therefore an accurate knowledge of the beam parameters is required - Hence, we developed a static, non-destructive beam diagnostic, a residual gas monitor (RGM), which extracts and measures residual gas particles- that are ionized by the ion beam via Coulomb collisions. The special design of the RGM allows serval operational modes: a beam current measurement in the range from some pA to uA, the examination of the beam's potential and electric field and, in addition, the manipulation of the spacecharge compensation in the beam.

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The Kiel suprathermal ion calibration facility - current status and next steps — •Lauri Panitzsch, Michael Stalder, and Robert F. Wimmer-Schweingruber — IEAP, Christian-Albrechts-Universitaet zu Kiel, Germany

The University of Kiel is establishing a suprathermal ion calibration facility. One of the main purposes of this facility is the calibration of space instrumentation for the solar wind and suprathermal particles, especially on Solar Orbiter and Solar Probe. The heart of the Kiel facility is a tunable 11 GHz (9-14 GHz) Electron-Cyclotron-Resonance-Ion-Source (ECRIS). A 90°-sector magnet selects the m/q ratio of the ion-beam, before the ions are electrostatically accelerated to energies up to 450keV/q, which equals energies of suprathermal solar particles. Other important beam parameters (beside the m/q-ratio and the energy) are beam current and profile, which are measured with a Faraday Cup (FC) and with a FC-Array respectively, allowing high resolution in current and position measurement. We are currently optimizing the source to increase beam current and the highest achievable charge states. Here we report on the current status of the facilities and the plans for the immediate future.

EP 7.18 Di 17:30 Foyer der Zahnklinik

Suprathermal particles with STEREO PLASTIC — •Christian Drews[1], Lars Berger[1], Robert F. Wimmer-Schweingruber[1], and Antoinette B. Galvin[2] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel — [2]Institute for the Study of Earth, Oceans and Space, University of New Hampshire

The **S**olar **TE**rrestrial **RE**lations **O**bservatory (**STEREO**) mission consists of two identical spacecraft. STEREO A leads along Earth's orbit while STEREO B trails it with an angular distance increasing by 22.5° per year. On board both spacecraft is the **PLA**sma and **S**upra**T**ermal **I**on **C**omposition instrument (**PLASTIC**), which is designed to investigate in-situ bulk properties of solar wind protons and the composition and properties of solar wind heavy ions. In addition, PLASTIC measures ions in an energy range above the solar wind, so-called suprathermal ions. This is achieved by a solar wind sector which is centered on the Sun-Earth line, covering an angular view of 45° in and ±20° out of the ecliptic, and a suprathermal ion **W**ide-**A**ngle **P**artition sector (**WAP**), covering 210° in azimuth and <10° in polar direction. The solar wind proton and alpha particle distributions often exhibit a non-Maxwellian feature, called suprathermal tail, which is believed to be produced in acceleration processes in, e.g. **CME's** (**C**oronal **M**ass **E**jection), **CIR's** (**C**orotating **I**nteraction **R**egions) or micro flares. With an engery range of up to 80keV/e PLASTIC is able to study the 3-dimensional evolution of these suprathermal particles, including injection and acceleration processes.

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WWW.NMDB.EU: Die Echtzeit Neutronen Monitor Datenbank — •Christian Steigies — IEAP, Christian-Albrechts-Universität zu Kiel, Kiel, Germany

Im Januar 2008 hat das NMDB Projekt begonnen, ein Projekt das im 7. Rahmenprogramm der Europäischen Kommission gefördert wird. Ein Jahr nach Beginn des Projekts senden 20 Neutronenmonitore Messdaten der Intensität der Kosmischen Strahlung an die NMDB Datenbank, einige davon in Echtzeit. Alle Messdaten werden durch die Datenbank in einem einheitlichen Format öffentlich verfügbar gemacht. Im Rahmen des Projektes werden Anwendungen entwickelt, die mithilfe der Echtzeitmessungen der Intensität der Kosmischen Strahlung Parameter des Weltraumwetters sowie die Strahlungsbelastung in Flugzeughöhen berechnen. Es wird ein Überblick über den Stand des Projektes gegeben. Des weiteren wird mit Hilfe von Webapplikationen gezeigt, wie die Datenbank von interessierten Anwendern genutzt werden kann.

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The dynamic response of the corona to photospheric driving — •Philippe-A. Bourdin, Sven Bingert, and Hardi Peter — Kiepenheuer-Institut für Sonnenphysik, Schöneckstr. 6, 79104 Freiburg, Deutschland

We present 3D MHD numerical experiments of coronal dynamics driven by photospheric horizontal motions. By comparing model runs with different resolutions and boundary conditions we investigate the connection from the chromosphere to the corona. The goal is to understand the injection of energy into the corona and the loading of coronal structures with mass. Through a comparison of the coronal structures found in the simulation with the spatial distribution of the heat input at the lower boundary we can study why bright loops fill only a small fraction of the available space.

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Large scale magnetic structure formation in 3D- MHD Turbulence — •Shiva Kumar Malapaka and Wolf-Christian Müller — Max-Planck -Institute for Plasma Physics, Garching bei München

Processes leading to the large scale magnetic structure formation from small scales in the universe are not yet clearly understood. Studies on one of the plausible processes namely inverse cascade of magnetic helicity in 3D- MHD turbulence, through direct numerical simulations is being reported here. The numerical simulation setup consists of an initial condition and a forcing placed in the small scales. Through the forcing we can introduce a fraction of magnetic helicity and or kinetic helicity over a band of wavenumbers in the small scales. In these simulations we observe power law behaviours in several quantities which hitherto are not known to show power law behaviours. We also observe different values to the power law exponents to the quantities, which were already known to show one. Only the total energy shows the expected k -5 / 3 power law behaviour, where k is the wavenumber. From the dimensional analysis of EDQNM(eddy damped quasi normal Markovian approximation) equations using these power laws , we ob-

tain a relation EkM ˜ (k2 HkM EkV) / HkV , from which we infer that the increase in the magnetic energy(EkM) might be due to an interaction between the magnetic and kinetic helicities, where HkM, EkV, HkV respectively represent magnetic helicity, kinetic energy and kinetic helicity. This relationship is also valid for a purely decaying 3D MHD turbulence case , where the initial condition is placed in relatively larger scales. The importance of decaying turbulence in large scale magnetic structure formation is emphasised.

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A low-dissipation central scheme for compressible MHD turbulence — •Christian Vogel and Wolf-Christian Müller — Max-Planck-Institute for Plasma Physics, Garching bei München

The efforts to study supersonic turbulence focus on turbulent dynamics which is probably of importance for star- and structure-formation in the interstellar medium. To this end, a new numerical framework is being developed to work reliably on turbulent configurations with Mach numbers greater than five. Special attention is paid to a low dissipation approach since thin and sharply resolved shock fronts are a dominant feature of supersonic turbulence. The new 2D and 3D compressible MHD codes are able to capture shocks while maintaining the divergence free constraint on the magnetic field. The underlying Kurganov-Tadmor type numerical scheme in combination with third order CWENO reconstruction is built on central differences meeting the requirements of low numerical dissipation and of high precision. The 3D MHD code has been parallelized in two space dimensions and allows for simulations with resolutions up to 10243. The experimental order of convergence was measured as O(x3). With the current set-up decaying supersonic compressible turbulence simulations at a resolution of 5123 have been carried out. The kinetic energy spectrum shows an inertial range spread over a decade in spectral space, showing a Kolmogorov-like scaling exponent and no bottleneck effect as is present in PPM simulations.

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Poroelastische Modellierung zur Entstehung von Ausflusstälern auf dem Mars — •Stefanie Musiol, Béatrice Cailleau und Gerhard Neukum — Freie Universität Berlin, Institut für geologische Wissenschaften, Fachrichtung Planetologie und Fernerkundung, Malteserstr. 74-100, 12249 Berlin

Ein gemeinsames Merkmal der Ausflusstäler (engl.: outflow channels) auf dem Mars ist ihr Ursprung in tiefen Senken oder chaotischen Gebieten. Unter der Annahme eines durch überlagernden Permafrost gespannten und in seinen Ausdehnungen begrenzten Grundwasserleiters untersuchen wir die mögliche Entstehung solcher Senken. Das Untersuchungsgebiet liegt auf der südlichen Halbkugel des Mars, am nordöstlichen Rand des Hellas-Einschlagsbeckens. Dort befinden sich die Ausflusstäler Dao, Niger und Harmakhis Vallis und die Vulkane Hadriaca und Tyrrhena Patera. Wir nehmen an, dass die Vulkanauflast das Gebiet tektonisch beansprucht hat, und es somit zur Bruchbildung und dem Aufstieg von Wasser an die Oberfläche kam. Die Modellierung erfolgt mit dem Finite-Elemente-Programm ABAQUS. Wir betrachten zeitabhängig Spannungen und Porendruck für variierende Parameter. Unser Ziel ist es, herauszufinden unter welchen Bedingungen und an welcher Stelle die Kruste aufbrechen könnte. Außerdem berechnen wir die maximal mögliche Ausflussmenge an Porenwasser. Die erhaltenen Werte werden mit Bild- und Topografiedaten von der High Resolution Stereo Camera (HRSC), die seit 2003 im Rahmen der Mission Mars Express (MEX) den Mars umkreist, verglichen.

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Bestimmung der Größen-Häufigkeitsverteilung (SFD) der Einschlagskrater-Populationen auf den Saturnmonden und Vergleich mit der SFD der Hauptgürtelasteroiden — •Nico Schmedemann[1], Gerhard Neukum[1], Oliver Hartmann[1], Roland Wagner[2] und Tilmann Denk[1] — [1]Institut für Geologische Wissenschaften, Freie Universität Berlin, Deutschland — [2]Institut für Planetenforschung, DLR Berlin, Deutschland

Die Untersuchung der SFD von Impaktkratern ist eine verlässliche und gut reproduzierbare Methode, um die stratigrafischen Beziehungen unterschiedlicher Oberflächeneinheiten zu bestimmen. Die Form der auf Iapetus gemessenen SFD ähnelt über vier Größenordnungen im Kraterdurchmesser sehr stark derjenigen des Erdmondes, was deren Verwendung für die Altersbestimmung nahe legt. Auch die SFDs weiterer Saturnmonde zeigen große Ähnlichkeiten mit der lunaren SFD. Dies trifft auch für die SFD der Asteroiden des Hauptgürtels zu, wenn der Bereich vom inneren Rand bei 2,1 AE bis zu 2,825 AE Sonnenabstand betrachtet wird. Diese Messergebnisse sind ein starkes Indiz für die Hypothese, dass der überwiegende Anteil kraterbildender Impaktoren auf dem Erdmond und auf den Saturnmonden einer gemeinsamen Population entstammen, welche die gleiche SFD-Charakteristik aufweist wie die SFD der Asteroidenkörper im angegeben Bereich. Ein weiterer Hinweis auf asteroidale Impaktoren ist die nahezu isotrope Kraterverteilung auf den Saturnmonden, die Impaktoren in planetozentrischen Orbits voraussetzt. Diese Isotropie wird u.a. durch Datierungen der markantesten Einschlagbecken auf Iapetus belegt.

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Applications and Performance of a Dust Telescope — •Ralf Srama[1,2], Sascha Kempf[1], Georg Moragas-Klostermeyer[1], Frank Postberg[3], Sean Hsu[1], Rene Laufer[2], Hartmut Henkel[4], Zoltan Sternovsky[5], Eberhard Grün[1], and Hans-Peter Röser[2] — [1]MPI Nuclear Physics, Heidelberg — [2]Univ. Stuttgart, IRS, Stuttgart — [3]Univ. Heidelberg — [4]von Hoerner & Sulger GmbH — [5]LASP, Univ. Colorado, USA

In-situ instrumentation for the measurement of cosmic dust is an excellent tool in Dust Astronomy. The Cosmic- Dust-Analyszer onboard Cassini provided unique information about interplanetary dust and about the dust distribution in the Saturnian system. The simultaneous determination of the grain properties like speed, charge, mass and composition is possible by current methods. Typical impact ionisation sensors are sensible to dust grains with sizes between 0.01 and 50 micron and with impact speeds between 1 and 300 km/s. Recent instrument developments allow for further improvements of dust grain trajectory and compositional measurements. The current sensor technologies are compared with new concepts and their applications. Future missions to the moon or to the inner solar system require more accurate and highly reliable detection techniques.