EP 3: Poster

Zeit: Montag 17:45–19:00 Raum: AKM Foyer

EP 3.1 Mo 17:45 AKM Foyer

In-situ exploration of plaetary atmospheres with balloons — •Michael Danielides[1], Jaime Esper[2], Georg Herdrich[3], Klaus Bayler[1], and Hannes Griebel[1] — [1]Mars Society Germany — [2]NASA Goddard Space Flight Center, USA — [3]Institute of Space Systems, University of Stuttgart, Germany

Balloon missions have been used extensively on Earth to study a large variety of atmospheric characteristics and phenomena. Of primary interest are in situ temperature, pressure and density profiles and wind velocities. The first planetary balloons were flown in the mid 1980s with the Vega 1 and 2 missions to Venus. Since then, balloons have been further planed for Mars and Titan. The aim of this presentation is to provide a brief overview of the current state in scientific ballooning, and in particular show existing data obtained through the MIRIAM (Main Inflated Re-entry Into the Atmosphere Mission Test) Mars balloon near space deployment experiments. The test ballute MIRIAM was flown on board a REXUS 4 sounding rocket from ESRANGE in northern Sweden on October 22nd, 2008. The balloon was deployed at about 140 km altitude. On board were optical instruments, magnetometers, temperature sensors and barometers for atmospheric studies. The data gathered during decent was used to validate inflation and deployment concepts, planetary balloon technologies. The new ballute probe MIRIAM-2 is under construction. It will record atmospheric parameters which will be then compared to Earth upper atmospheric models. Finally, future prospects for balloon use on Mars and Titan will be addressed and discussed.

EP 3.2 Mo 17:45 AKM Foyer

Space weather application center Ionosphere (SWACI) - a common data base for scientific research — N. Jakowski, C. Mayer, K.D. Missling, H. Barkmann, C. Becker, C. Borries, H. Maass, T. Noack, M. Tegler, V. Wilken, and •M. Danielides — German Aerospace Center (DLR), D-17235 Neustrelitz, Germany

The Space Weather Application Center Ionosphere (SWACI) is a joint project of the Institute of Communications and Navigation (IKN) and the German Remote Data Center (DFD) of the German Aerospace Center, essentially supported by the State Government of Mecklenburg-Vorpommern. SWACI (http://swaciweb.dlr.de) operates a powerful data processing system working both in real-time and post-processing modes. Typical data products include European maps of the Total Electron Content (TEC) and corresponding derivatives, updated every 5 minutes. Space based retrievals include radio occultation data as well as a 3D reconstruction of the topside ionosphere. Furthermore, the equivalent slab thickness over the ionosonde station Juliusruh/Germany is offered, updated every 15 min. In addition to the processing of GNSS data, also beacon measurements from various satellites such as NIMS and COSMIC are received and analysed. Although the SWACI service will be fully operational by the end of 2010, SWACI is already available for interested users at a service level reached so far.

EP 3.3 Mo 17:45 AKM Foyer

On the definition and calculation of a generalised McIlwain parameter — •Andreas Kopp[1], Julia Pilchowski[2], Klaudia Herbst[1], and Bernd Heber[1] — [1]IEAP, Christian-Albrechts-Universität zu Kiel, 24118 Kiel — [2]Geophysical Institute, University of Alaska, 903 Koyukuk Drive, 99775-7320 Fairbanks, USA

The L parameter, which indicates the distance where a magnetic field line crosses the equatorial plane, is defined only for an aligned magnetic dipole field. For a realistic planetary magnetic field, however, neither a definition nor a method to calculate this parameter are available so far. We therefore, extent the definition of the McIlwain parameter for an arbitrary planetary magnetic field and numerically calculate it for the actual geomagnetic field. In order to do so, we first calculate the Earth's magnetic field for 2008 with the IGRF model. To motivate a proper definition for a general L parameter, each component of this field will be illustrated and discussed. In second step, we present four possible definitions for the L parameter and discuss their properties and differences with respect to the question in how far they reflect the field geometry. We contrast our method with the traditional derivation of the L parameter employing numerical simulations of the cut-off rigidities of energetic particles and an empirical relation between the latter and L.

EP 3.4 Mo 17:45 AKM Foyer

^{10}Be Production Calculations in the Atmosphere — •Klaudia Herbst[1], Daniel Matthiä[2], Friedhelm Steinhilber[3], and Bernd Heber[1] — [1]IEAP, Christian-Albrechts-Universität zu Kiel, Kiel, Germany — [2]Institut für Luft- und Raumfahrtmedizin, Deutsches Zentrum für Luft- und Raumfahrt, Köln, Germany — [3]Swiss Federal Institute of Aquatic Science and Technology, Ewag, Dübendorf, Switzerland

Cosmic Rays (CRs) interacting with the Earth's atmosphere produce a cascade of secondary particles and cosmogenic nuclides. Cosmogenic nuclides itself are stored in natural archives such as ice cores and can therefore be measured by e.g. accelerator mass spectrometry (AMS). Here we present our calculations of the cosmogenic radionuclide ^{10}Be, which is produced by spallation reactions between secondary neutrons and protons and the atmospheric gases nitrogen and oxygen, using PLANETOCOSMICS, a GEANT4 based computer code (Desorgher [2006]).

EP 3.5 Mo 17:45 AKM Foyer

On the importance of the Local Interstellar Spectrum for the Solar Modulation Parameter — •Klaudia Herbst[1], Andreas Kopp[1], Bernd Heber[1], Friedhelm Steinhilber[2], Horst Fichtner[3], Klaus Scherer[3], and Daniel Matthiä[4,1] — [1]IEAP, Christian-Albrechts-Universität zu Kiel, Kiel, Germany — [2]Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland — [3]Theoretische Physik IV, Ruhr-Universität Bochum, Bochum, Germany — [4]Institut für Luft- und Raumfahrtmedizin, Deutsches Zentrum für Luft- und Raumfahrt, Köln, Germany

We compare several local interstellar proton spectra often used in literature. We show that the modulation parameter ϕ, which parametrizes the modulation of the local interstellar spectrum (LIS) in the heliosphere, strongly depends on the LIS itself. Taking the LIS dependency of the modulation parameter into account, we derive linear equations to convert ϕ between the different LIS. The conversions used are afterwards applied to a long-term reconstruction of ϕ derived from a record of the cosmogenic radionuclide, ^{10}Be. For some LIS models occasionally negative ϕ values are obtained, a fact which is impossible from the physical point of view. Despite non-heliospheric effects such as uncertainties in the geomagnetic field and climate influences on the ^{10}Be production, one possible reason may also be the choice of the LIS. We show that the reconstruction of ϕ provides the potential to derive the lower intensity limit of the LIS, keeping in mind that first the non-heliospheric effects have to be removed from the data.

EP 3.6 Mo 17:45 AKM Foyer

EISCAT-CAWSES-Copernicus Consortium to support German EISCAT user groups — •Norbert Engler[1], Jürgen Röttger[2], and Renate Scherer[3] — [1]Leibniz-Institut für Atmosphärenphysik an der Universität Rostock, Schlossstr. 6, 18225 Kühlungsborn — [2]MPI für Sonnensystemphysik, Max-Planck-Str. 1, 37191 Katlenburg-Lindau — [3]Copernicus Gesellschaft, Bahnhofsallee 1e, 37081 Göttingen

In the framework of the CAWSES priority program funded by the German Research Foundation (DFG) the German contribution to the European Incoherent Scatter Radar (EISCAT) is provided. Several research groups are actively using the possibility to obtain data from the EISCAT experiments. Current activities of German EISCAT users and future perspectives are presented to the community. Science and technical support will be introduced to provide successful usage of the available measurements and the results.

EP 3.7 Mo 17:45 AKM Foyer

Absorption von Radiowellen in der Venusatmosphäre — •Janusz Oschlisniok[1], Martin Pätzold[1], Bernd Häusler[2], Silvia Tellmann[1], Thomas Andert[2], Riccardo Mattei[2] und Christopher Krüger[2] — [1]Rheinisches Institut für Umweltforschung, Abteilung Planetenforschung, Universität zu Köln — [2]Institut für Raumfahrttechnik, Universität der Bundeswehr München, Neubiberg

Ein Radiosignal wird auf dem Weg von der Raumsonde zur Bodenstation auf der Erde durch unterschiedliche Faktoren abgeschwächt,

wovon die Strahlaufweitung (Defocusig) des Signals aufgrund unterschiedlicher Dichte in unterschiedlichen Höhen und die Absorption des Signals durch das atmosphärische Gasgemisch zu den wichtigsten zählen. Frühere Beobachtungen am Planeten Venus zeigten, dass die größte Abschwächung von Radiowellen im Mikrowellenbereich in der Atmosphäre direkt unterhalb der Wolkenregion zwischen ca. 35 und 50 km Höhe stattfindet. Aus der Intensität der aufgezeichneten Signalstärke in der Bodenstation lassen sich Aussagen über die Dämpfung des Radiosignals in der Atmosphäre des Planeten machen und somit Absorptionsprofile ableiten. Das Radio Science Experiment VeRa an Bord der Sonde Venus Express, welche sich seit 2003 im Orbit der Venus befindet wird unter anderem dazu benutzt, die Atmosphäre des Planeten mit Radiowellen zu sondieren. Die mehr als 250 bisher gemessenen vertikalen Profile aus der Atmosphäre haben eine Verteilung über alle planetaren Breiten über unterschiedliche Lokalzeiten. Diese Präsentation zeigt die mittels VeRa erhaltenen Absorptionsprofile.

EP 3.8 Mo 17:45 AKM Foyer

Analysation of the influence of water and higher atmospheric pressure levels on the Martian radiation environment - implications for Martian habitability in the Noachian era — •Bent Ehresmann, Robert F. Wimmer-Schweingruber, Sönke Burmeister, Jan Köhler, Onno Kortmann, and Thomas Möller — IEAP, Christian-Albrechts-Universität zu Kiel

In comparison to Earth, the low atmospheric pressure on today's Mars provides only very weak shielding of the Martian surface against cosmic radiation and allows galactic cosmic rays to propagate all the way to the ground to interact with the soil. Hence, the radiation environment on Mars is more hazardous for life than on Earth.

To this date, the exact environmental conditions on Mars during the Noachian are still unknown. However, it is widely agreed upon that liquid water existed on the surface at least sporadically during this time span and that Mars possessed a significantly higher atmospheric pressure level which would in all likelihood have resulted in a less hostile surface radiation environment for the possible emergence and evolution of life.

Using Planetocosmics, we calculate particle radiation in the Martian atmosphere and at ground level for different atmospheric and environmental conditions. Here, we present radiation environments for different atmospheric pressure levels, as well as for the presence of liquid water on the surface or subsurface water-ice.

EP 3.9 Mo 17:45 AKM Foyer

Ionopausenstrukturen an Mars und Venus beobachtet von MaRS auf Mars Express und VeRa auf Venus Express — •Kerstin Peter[1], Martin Pätzold[1], Bernd Häusler[2], Silvia Tellmann[1], Dave Hinson[3] und G.L. Tyler[3] — [1]Rheinisches Institut für Umweltforschung, Köln, Deutschland — [2]Institut für Raumfahrttechnik, Uni der Bundeswehr München, Neubiberg, Deutschland — [3]Dept. of Electr. Engineering, Stanford University, California, USA

Die Ionopause eines Planeten ist definiert als Grenze zwischen planetarer Ionosphäre und interplanetarem Sonnenwind. In früheren Venus-Beobachtungen wurde diese u.a. als starker Abfall in der ionosphärischen Elektronendichte hin zu sehr kleinen Werten beobachtet. Die Marsionopause konnte aufgrund hohen Rauschens in den Viking-Elektronendichteprofilen und fehlender Höhenabdeckung durch MGS bisher nicht ausreichend untersucht werden. Mit dem Radio Science Experiment MaRS auf Mars Express konnten seit April 2004 aufgrund des stark elliptischen Orbits mehr als 400 vertikale Elektronendichteprofile der Marsionosphäre unterhalb von ca. 1500 km Höhe gemessen werden. Mit dem Radio Science Experiment VeRa auf Venus Express konnten seit Dezember 2005 bisher mehr als 140 vertikale Elektronendichteprofilen gemessen werden. Diese Studie verwendet als Ionopausendefinition eine starke Abweichung des Elektronendichtegradienten von dem Gradienten in der idealen Diffusionsregion. Vorgestellt werden die Ionopausenbeobachtungen von MaRS und VeRa der Jahre 2005 bis 2009 und es erfolgt ein Vergleich mit Ionopausenbeobachtungen früherer Missionen.

EP 3.10 Mo 17:45 AKM Foyer

The APXS (Alpha Particle X-Ray Spectrometer) within the Rosetta mission: Preliminary tests and preparations for landing on a comet — •Dirk Schmanke[1], Jordi Girones Lopez[1], Göstar Klingelhöfer[1], Jasmin Maul[1], Johannes Brückner[2], Ralf Gellert[3], and Claude d'Uston[4] — [1]Inst. für anorg. u. analyt. Chemie, JoGu-Universität, Staudinger Weg 9, Mainz — [2]Max-Planck-Institut für Chemie, Mainz — [3]Department of Physics, University of Guelph, Canada — [4]CESR, Toulouse, France

The Rosetta Mission was launched in 2004 with the main objectives to gain a better understanding of the origin and formation of comets. After 10 years the comet 67P/Churyumov-Gerasimenko will be reached and the probe will split into an orbiter and a lander. As a part of the lander payload APXS will measure in situ the chemical composition of the comet's surface and it's alteration during the trajectory of the comet around the sun. APXS combines an alpha mode for alpha spectroscopy and a x-ray mode for alpha particle/x-ray induced x-ray spectroscopy in one single instrument, being low in mass and power consumption. The cometary surface will be irradiated by a Curium 244 source, which will excite characteristic x-rays of the present elements. The alpha detectors will allow detection of elements like C and O and groups of elements with a higher Z. The x-ray-SD-detector will allow to detect most of the elements from Na to Ni. During the journey to the comet preliminary tests of the Rosetta probe and its payload at regular intervals are performed. They are used to optimize and improve the quality of the x-ray spectra of the APXS.

EP 3.11 Mo 17:45 AKM Foyer

Current-sheet driven spectral modulation of MeV electrons in the Jovian magnetosphere: Ulysses observations — •Andreas Kopp, Phillip Dunzlaff, and Bernd Heber — IEAP, Christian-Albrechts-Universität zu Kiel, 24118 Kiel

The dynamics of the Jovian magnetosphere is dominated by the planet's fast rotation with a period of about 10h. This periodicity can in particular be seen in the temporal variation of the spectral index of energetic particles. Derived from Pioneer observations, three models were developed to explain this phenomenon, the most prominent of which is the so-called Jovian clock model. Based on the observation of only a 10h periodicity being present in the data, this model predicts that this periodicity is caused only by temporal, but not by spatial variations, i.e. the observations become independent of the spacecraft's position. In order to investigate the origin of this 10h periodicity, we re-investigated data of the KET and HET instruments aboard Ulysses during the spacecraft's Jupiter flyby in February 1992. In contrast to former analyses, we could find by means of a Lomb-Scargle analysis additionally a small, but significant 5h periodicity, suggesting a connection with the current sheet. A closer analysis revealed the signal to be caused by a 10h variation due to the rotation of the magnetosphere being interrupted by crossings of the current sheet. The peaks of this 10h variation can be explained by crossings of the dipole plane with the spacecraft's trajectory. We conclude, thus, that the 10h periodicity can be explained by a simple model of the rotating, tilted dipole eld and the resulting up and down motion of the current sheet.

EP 3.12 Mo 17:45 AKM Foyer

Ergebnisse und Erfahrungen mit der Detektionssoftware ExoTrans. Die Suche nach extrasolaren Planeten in Lichtkurven des Weltraumteleskops CoRoT. — •Sascha Grziwa, Ludmila Carone und Martin Pätzold — Rheinisches Institut für Umweltforschung, Abteilung Planetenforschung, Universität zu Köln, Köln

CoRoT ist ein französisches Weltraumteleskop mit deutscher Beteiligung zur Entdeckung extrasolarer Planeten, welches sich seit drei Jahren im Erdorbit befindet. In dieser Zeit wurde eine große Anzahl zu verarbeitender Lichtkurven produziert. Mit Hilfe der speziell für diese Mission entwickelten Detektionssoftware ExoTrans wird diese große Datenmenge automatisch verarbeitet und mögliche extrasolare Planeten durch Transits detektiert. Die Software kombiniert zwei verschiedene Filterverfahren (Harmonischer und Trend Filter) mit drei verschiedenen Box-Fitting Algorithmen (BLS, dcBLS, unmaxBLS). Die verschiedenen Filterverfahren und Erkennungsalgorithmen werden verglichen und die bisherigen Erfahrungen aus der ersten Weltraummission zur Entdeckung Extrasolarer Planeten beschrieben.

EP 3.13 Mo 17:45 AKM Foyer

Multi-strand coronal loop model and filter-ratio analysis — •Sofiane Bourouaine and Eckart Marsch — Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau, Germany

We model a coronal loop as a bundle of seven separate strands or filaments. Each of the loop strands used in this model can independently be heated (near their left footpoints) by Alfvén/ion-cyclotron waves via wave-particle interactions. The Alfvén waves are assumed to penetrate the strands from their footpoints, at which we consider different wave energy inputs. As a result, the loop strands can have different

heating profiles, and the differential heating can lead to a varying cross-field temperature in the total coronal loop. The simulation of TRACE observations by means of this loop model implies two uniform temperatures along the loop length, one inferred from the 171:195 filter ratio and the other from the 171:284 ratio. The reproduced flat temperature profiles are consistent with those inferred from the observed EUV coronal loops. According to our model, the flat temperature profile is a consequence of the coronal loop consisting of filaments, which have different temperatures but almost similar emission measures in the cross-field direction. Furthermore, when we assume certain errors in the simulated loop emissions and use the triple-filter analysis, our simulated loop conditions become consistent with those of an isothermal plasma. This implies that the use of TRACE/EIT triple filters for observation of a warm coronal loop may not help in determining whether the cross-field isothermal assumption is satisfied or not.

EP 3.14 Mo 17:45 AKM Foyer

Influence of radiative loss and heat conduction on the temperature variation in of a coronal bright point — •Setareh Javadi[1], Jörg Büchner[1], Jean-Carlo Santos[1], and Antonius Otto[2] — [1]Max-Planck-Institut für Sonnensystemforschung, Max-Planck-Str.2, 37191, Katlenburg-Lindau, Germany — [2]University of Alaska, Fairbanks

Using the 3D numerical simulation model LINMOD3d a realistic approach was taken to simulate the heating processes associated with the formation of solar coronal bright points (BPs). The thermal structure of a coronal BP region was investigated by taking into account the influence of heat losses through thermal conduction and radiation. Comparing the results for cases with and without taking into account radiative loss and heat conduction the influence of these two factors on the formation of the BP temparture is discussed.

EP 3.15 Mo 17:45 AKM Foyer

The influence of discrete scattering events on solar energetic particle propagation — •Jan Köhler and Robert F. Wimmer-Schweingruber — IEAP, Christian-Albrechts-Universität Kiel

Pitch-angle scattering in solar particle events is often described as a diffusive processes. However, the concept of the diffusion approximation breaks down if the frequency of the scattering events is small compared to the observation time. In this work we investigate the effect of rare discrete scattering events compared to frequent (diffusive) scattering, using two different models which describe energetic particle propagation in the heliosphere. For a guiding center approximation we directly compare different scattering frequencies and mean free path lengths while keeping the diffusion coefficient constant. In an ab-initio model we calculate the exact particle motion in a Parker field superimposed with magnetic fluctuations. For a given spectrum of fluctuations one can create different wave configurations which correspond to different mean free path values. For both models pitch-angle anisotropy and intensity profile both depend significantly on scattering frequency resp. mean free path.

EP 3.16 Mo 17:45 AKM Foyer

Characterization of inorganic scintillators for the HET/EPD instrument on board Solar Orbiter — •Cesar Martin, Shrinivasrao Kulkarni, Daniel Sommerfeld, Björn Schuster, Onno Kortmann, Stephan Böttcher, Robert F. Wimmer-Schweingruber, Lars Seimetz, Christiane Helmke, and Stefan Kolbe — Institut für Experimentelle und Angewandte Physik Christian-Albrecht-Universität zu Kiel, Kiel, Germany

Solar Orbiter is one of the ESA's missions planned for operating as close to the sun as 0.234 AU. The detection and characterization of the high-energy particles is one of the science requirements of the planned mission. We have designed a high-energy telescope (HET) with an inorganic scintillator crystal and semiconductor detectors. HET will detect and characterize electrons from 0.3 - 25 MeV, protons 10 - 100 MeV and heavy ions 50 - 200 MeV/n. The scintillator detector is the heart of the proposed design. Hence, characterization of the different scintillator materials is very important to select a suitable candidate for operating the instrument on the proposed orbit. Here, we will present studies performed on CsI(Tl), LaBr3, BGO and GSO including intrinsic radioactivity, quenching and temperature dependence of the light yield.

EP 3.17 Mo 17:45 AKM Foyer

Heavy pickup ions at 1 AU — •Christian Drews[1], Lars Berger[1], Robert F. Wimmer-Schweingruber[1], Antoinette B. Galvin[2], Berndt Klecker[3], and Eberhard Möbius[2] — [1]Institute for Experimental and Applied Physics, Christian-Albrechts-University zu Kiel, Germany — [2]Space Science Center & Department of Physics, University of New Hampshire, New Hampshire — [3]Max Planck Institute for Extraterrestrial Physics, Garching

Previous work has shown that pickup ions in the heliosphere are either of interstellar or solar wind origin. Because interstellar neutral He is focused by the gravitation of the Sun, count rates of interstellar He pickup ions show a distinctive peak when the observer has the Sun between himself and the interstellar inflow direction. Using the large geometric factor of the PLAsma and SupraThermal Ion Composition (PLASTIC) instrument on the Solar TErrestrial RElations Observators (STEREO) mission, we have clearly identified this so-called He focusing cone. Remarkably, not only He+ pickup ions are enhanced during these periods, but for the first time we also observe clear enhancements of Ne+ pickup ions during focusing cone passages.

The lower first ionization potentials (FIP) of Carbon and Oxygen in respect to Helium and Neon on the other hand, prevent these interstellar neutrals to penetrate deep into the heliosphere and a significant enhancement of C+ and O+ during cone passages is not observed. Indeed, the measured C/O ratio implies C+ and O+ to be primarily of solar wind origin.

EP 3.18 Mo 17:45 AKM Foyer

Inner-Source Pickup Ions as sensitive Tracers of the Inner-Heliospheric Microstate — •Robert F. Wimmer-Schweingruber[1], Jan Köhler[1], and Peter Bochsler[2] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universiät zu Kiel, 24098 Kiel — [2]University of New Hampsire, Space Science Center & Department of Physics, Morse Hall, 8 College Road, Durham, NH 03824, USA

Inner-source pickup ions have been investigated by several workers who all assumed an initial velocity distribution function which is dominated by high velocities in the solar wind velocity frame. This is supposed to be due to the Lorentz force which acts on the freshly ionized particles. Because the location where inner-source pickup ions are ionized lies close to the Sun (probably between 5 and 25 $r_{\odot}$) and the magnetic field is near radial there, the Lorentz force acting on freshly created ions is small.

Here we show that particles desorbed from interplanetary dust particles only experience a very small mirror force in the inner heliosphere. Such pickup ions are accelerated by waves and thus serve as sensitive tracers to the level of wave-particle interactions in the inner heliosphere. The average charge state of heavy pip ions yields information about the source location.

EP 3.19 Mo 17:45 AKM Foyer

Experimental Investigation of Magnetic Flux Tubes — •Holger Stein, Jan Tenfelde, Philipp Kempkes, Felix Mackel, and Henning Soltwisch — Ruhr University Bochum, Bochum, Germany

In the frame of the FlareLab project an arc-shaped discharge, reminiscent to solar flares, is investigated. Induction probes are employed to determine the different components of the magnetic field. Combining this with information about the plasma parameters (electron density and temperature) and the velocity and width of the flux tubes, the current density profile can be calculated. This additional information is cross-checked by at least two diagnostics, including electrostatic probes, laser interferometry, basic spectroscopy and images from a fast framing ICCD camera. Furthermore, components of the magnetic data indicate frozen magnetic flux in the plasma, which originates from an external guiding field at the plasma source. The aim of this effort is a consistant characterisation of the flux tubes, in terms of force balances.

EP 3.20 Mo 17:45 AKM Foyer

3D velocity distribution functions of heavy ions and kinetic properties of fast solar wind O^{6+} at 1 AU — •Lars Berger and Robert F. Wimmer-Schweingruber — Extraterrestrial Physics, Institute for Experimental and Applied Physics, Christian-Albrechts-University Kiel, Germany

The kinetic properties of the solar wind are a result of complex interactions in the solar corona and interplanetary space. So far, observations of Velocity Distribution Functions (VDFs) of solar wind heavy ions have been solely 1D. They are known to exhibit non-thermal features, but because they are 1D projections of the 3D velocity phase space it is difficult to interpret them properly. We have modeled heavy-ion VDFs

based on 3D observations of protons and alpha particles from Helios. In the model, the magnetic field vector plays a crucial role by defining the symmetry axis of the VDFs. A thermal anisotropy $T_{\parallel}/T_{\perp} \neq 1$ and a beam drifting along the magnetic field vector at a relative speed of approximately the Alfvén speed are included. The modeled VDFs are analysed using a virtual detector and then compared with data from the Solar Wind Ion Composition Spectrometer (SWICS) on the Advanced Composition Explorer (ACE). Our observations give evidence for the existence of heavy-ion beams. The projection of these beams can explain observed differential streaming. Especially the rare periods of negative differential streaming correspond to periods in which the magnetic field lines are strongly bend no longer pointing towards Earth but towards the Sun. We present in-situ measurements and derived kinetic properties of fast solar wind O^{6+} at 1 AU.

EP 3.21 Mo 17:45 AKM Foyer

On the influence of the solar differential rotation on the heliospheric magnetic field — •Phillip Dunzlaff[1], Andreas Kopp[1], Bernd Heber[1], Klaus Scherer[2], Oliver Sternal[1], and Adri Burger[3] — [1]IEAP, Christian-Albrechts-Universität zu Kiel, Leibnizstrasse 11, 24118 Kiel — [2]Theoretische Physik IV, Ruhr-Universität Bochum, 44780 Bochum — [3]School of Physics, North-West University, 2520 Potchefstroom, South Africa

The form of the field lines of the interplanetary magnetic field (IMF) is determined by the rotation of the Sun. In combination with the fact that the IMF is frozen into the solar wind, this leads to the well-known Parker spiral. While Parker's model has been verified by numerous in-situ measurements in the ecliptic plane, the question arises about the latitudinal variation of the spiral. An essential point here is the differential rotation of the Sun of about 25 days in equatorial region and more than 30 days at higher latitudes. The Ulysses mission offers the unique opportunity to investigate this question by providing solar wind and magnetic field data at high latitudes as well as larger distances from the Sun. Thus, we compare the Parker angle derived from magnetic field data with the "nominal" one, computed with the respective solar wind velocity. The analysis shows a considerably better agreement between the two angles assuming a differential rotation of the Sun rather than a rigid one, but also significant deviations in the ecliptic plane at larger distances from the Sun.

EP 3.22 Mo 17:45 AKM Foyer

Geant4-Simulations for EPT onboard Solar Orbiter — •Rolf Paspirgilis for the EPT-Collaboration-Collaboration — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität Kiel, Leibnizstraße 11, 24118 Kiel

The ESA mission Solar Orbiter will investigate the sun's atmosphere and heliosphere from a distance between 0.23 AU and >1 AU. Onboard, the Energetic Particle Detector (EPD) will measure the composition, time series and distribution functions of suprathermal and energetic particles. The EPD consists of five seperate sensors – one of them is the Electron Proton Telescope (EPT).

The EPT is designed to detect and measure electrons, protons and α-particles with energies in the range from 20 keV to 700 keV for electrons and from 20 keV to 9 MeV for protons and α-particles. Low energy electrons and nucleons stopping in the first detector are distinguished between each other by using a foil/magnet-combination, while at higher energies the $\frac{dE}{dx}$-E-method is utilized.

We use the CERN framework Geant4 to simulate the behaviour of the EPT-design – i.e., we vary the dimensions and the setup of the design in order to determine the consequences of these variations on the particle measurement – e.g. the energy dependent geometrical factor.

EP 3.23 Mo 17:45 AKM Foyer

NMDB: towards a global neutron monitor database — •Christian T. Steigies[1] and Karl-Ludwig Klein[2] — [1]Christian-Albrechts-Universität zu Kiel — [2]Observatoire de Paris

The real-time database for high resolution neutron monitor measurements (NMDB) is a scientific data repository funded by the European Commission for two years. At the end of the NMDB project, we have successfully created a repository for Cosmic Ray data from ground based neutron monitors. We have created tools to access the data and online applications that use this data, for example to calculate cosmic ray spectra, the ionisation of the atmosphere, or to give an automatic alert of a ground-level event. So far mostly European stations are contributing to this database. To reach the full potential of a Cosmic Ray database more stations from outside Europe have to be included. NMDB is preparing workshops to discuss with international partners about their participation in a global neutron monitor database project.

EP 3.24 Mo 17:45 AKM Foyer

Almost monoenergetic ions during IP shock passages: STEREO/SEPT observations — Andreas Klassen, Raul Gomez-Herrero, Reinhold Müller-Mellin, and •Bernd Heber — IEAP, Universität Kiel, Deutschland

We present observations of ion events in the energy range of 100-1000 keV during the times of interplanetary (IP) forward shock passages associated with Corotating Interaction Regions (CIR). The detected energy spectra contain strong peaks with relative widths at half maximum (FWHM) of 0.3-0.6 and their energy maxima lie around 150 and 230 keV. The duration of the events varies from some minutes up to half an hour. These events were detected when STEREO-A or STEREO-B were relatively far away from the Earth at distances from 0.27 up to 1.0 AU.

In the past similar spectral peaks, so-called Almost Monoenergetic Ion (AMI) events, were detected during upstream events close to the Earth's bow-shock using observations on Interball-1 and STEREO A & B. We discuss the origin of these events and present indications that the narrow spectral peaks may be caused by quasi-monoenergetic beams of protons accelerated at the IP shock.

EP 3.25 Mo 17:45 AKM Foyer

Suprathermal ions with STEREO/PLASTIC — Jan-Dirk Kohlmann[1], Robert F. Wimmer-Schweingruber[1], Christian Drews[1], Lars Berger[1], and •Antoinette B. Galvin[2] — [1]Institute for Experimental and Applied Physics, Christian-Albrechts-University zu Kiel, Germany — [2]Space Science Center & Department of Physics, University of New Hampshire, New Hampshire

The PLAsma and SupraThermal Ion Composition (PLASTIC) instrument is part of the NASA Solar TErrestrial RElations Observatory (STEREO) Mission. It consists of two almost identical spacecrafts, STEREO-A (Ahead of the Earth) and STEREO-B (Behind the Earth). PLASTIC is a linear time-of-flight mass spectrometer. It is capable of measuring particles in an energyrange from 0.3 to 80 keV/e. The instrument is divided into two main apertures. The Solar wind sector (SWS) is pointing directly to the sun, it has field of view of 45° and a resolution of 1.4° in the ecliptic and ± 22.5° with a resolution of 1.4° in polar direction. The suprathermal ion Wide-Angel Partition sector (WAP) covers a range of 218° in the ecliptic and 10° in polar direction. The broad azimuthal and polar angle coverage together with the large geometry factor of the instrument allows for studies of suprathermal particles e.g. Pick-Up Ions (PUIs) in unprecedent quality. We have developed a model of PLASTIC that calculates the expected count-rates depending on the angle of incidence for any input velocity distribution. Comparing the results from this virtual detector with observations the 3D velocity distribution of ions can be reconstructed. Here we present first results for He^{1+}.

EP 3.26 Mo 17:45 AKM Foyer

Multi-point observations of CIR-associated energetic ions — Nina Dresing[1], Raul Gomez-Herrero[1], Olga Malandraki[2], Emilia Kilpua[3], •Bernd Heber[1], Andreas Klassen[1], Reinhold Müller-Mellin[1], and Robert F. Wimmer-Schweingruber[1] — [1]IEAP, Universität Kiel, Deutschland — [2]Institute for Astronomy and Astrophysics, National Observatory of Athens, Greece — [3]Department of Physical Sciences, Theoretical Physics Division, University of Helsinki, Finland

In absence of solar activity, Co-rotating Interaction Regions (CIRs) are a prevailing source of energetic ions observed near 1 AU. The twin STEREO spacecraft launched in October 2006, together with near-Earth spatial observatories offer an excellent platform for multi-point studies of CIR. Time-shifting and back-mapping techniques allow the comparison of ion increases observed by different spacecraft at different times but associated to the same CIR. The analysis shows that CIR-associated ions frequently show significant differences, particularly at sub-MeV energies. We present several cases where these differences are linked to the presence of Interplanetary Coronal Mass Ejections (ICMEs) or small-scale interplanetary transients in the vicinity or embedded in the CIR. Evidences of the possible role of ICME-CIR interaction as sources of temporal variations in the CIR-associated ion increases are presented and discussed.

EP 3.27 Mo 17:45 AKM Foyer

Mesh adaptive numerical simulation of current sheet formation at quasi-separatrix layers — •Kay Thust, Frederic Ef-

fenberger, Jürgen Dreher, and Rainer Grauer — Theoretische Physik I, Ruhr-Universität Bochum, Germany

Magnetic reconnection is thought to play a major role in the understanding of the coronal heating problem and the mechanisms leading to solar flares and coronal mass ejections. One preferential site for reconnection are thin current sheets.

To study the formation of current sheets, models without separators or null points are of particular interest. In these models quasi-separatrix layers, which are defined by a strong but still continuous variation of the field line linkage, play a role similar to classical separators.

In a numerical experiment based on ideal MHD, Aulanier et al. (A&A, 2005) studied a magnetic field configuration with a quadrupolar photospheric signature that contains a hyperbolic flux tube. As remarked by those authors, a further analysis of the small-scale structures was limited by the resolution of the numerical mesh.

To alleviate this problem, we have carried out similar MHD simulations using the technique of adaptive mesh refinement (AMR), which allowed us to achieve local resolutions of up to 8192^3 in the areas of interest, more than a factor of 10 higher than the runs by Aulanier et al. On these scales our results still largely confirm the previous work, which also showed a collapse of the current sheet down to the mesh resolution.

EP 3.28 Mo 17:45 AKM Foyer

Erkennung und Charakterisierung von Doppelsternsystemen aus Lichtkurven der Weltraummission CoRoT. — •Sascha Grziwa und Martin Pätzold — Rheinisches Institut für Umweltforschung, Abteilung Planetenforschung, Universität zu Köln, Köln

Eine große Anzahl von Sternen sind selbstbedeckende Doppelsternsysteme. Sie lassen sich zum Teil an Hand ihrer Lichtkurven identifizieren und die Parameter des Systems können bestimmt werden (Massen, Halbachsen, Exzentrizität, etc.). Ein anderer Teil dieser Doppelsternsysteme lässt sich auf den ersten Blick nicht von planetaren Transits unterscheiden. Auch in den Sternfeldern des Weltraumteleskops CoRoT findet sich eine große Anzahl Doppelsterne. Die von bodengestützten Teleskopen bisher unerreichte Qualität der Lichtkurven, sowie die Länge der ununterbrochene Messungen kann zu einer genauen Bestimmung der Parameter dieser Doppelsterne genutzt werden. Mit Hilfe von theoretischen Modellen wird die Wahrscheinlichkeit der Existenz des Systems abgeschätzt. Durch diese Untersuchung werden die Doppelsternsysteme statistisch klassifiziert. Im Rahmen der Detektion von Exoplaneten dienen die Ergebnisse zur Unterscheidung zwischen Doppelsternbedeckungen und Planetentransits und der Suche nach Exoplaneten in Doppelsternsystemen.

EP 3.29 Mo 17:45 AKM Foyer

Stellar Axion Models — •Daniel Nowakowski[1], Markus Kuster[1], Achim Weiss[2], Claudia-V. Meister[1], Florian Fülbert[1], and Dieter H. H. Hoffmann[1] — [1]TU Darmstadt, Institut für Kernphysik, Schlossgartenstrasse 9, 64289 Darmstadt — [2]Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Strasse 1, 85748 Garching

An axion helioscope is typically operated to observe the sun as an axion source. Additional pointings at celestial sources, e.g. stars in other galaxies, result in possible detections of axions from distant galactic objects. For the observation of supplementary axion sources we therefore calculate the thereotical axion flux from distant stars by extending axionic flux models for the axion Primakoff effect in the sun to other main sequence stars. The main sequence star models used for our calculations are based on full stellar structure calculations. To deduce the effective axion flux of stellar objects incident on the Earth the All-Sky catalogue was used to obtain the spectral class and distance of the stars treated.
Our calculations of the axion flux in the galactic plane show that for a zero age main sequence star an maximum axion flux of $\Phi_a = 303.43\,\mathrm{cm}^{-2}\,\mathrm{s}^{-1}$ could be expected. Furthermore we present estimates of axion fluxes from time-evolved stars.

EP 3.30 Mo 17:45 AKM Foyer

The X-shaped bulge of NGC 4710 — •Rainer Lütticke — Labor für Physik, Hochschule Bochum, Lennershofstr. 140

A few years ago there were several studies to classify the morphology of bulges, as being for example a peanut- or a box-shaped bulge (b/p bulge) (cf. Lütticke, Dettmar, & Pohlen, 2000, A&AS 145, 405 [LDP]). The largest study of this morphology so far (LDP) shows that 4% of all edge-on disk galaxies have a peanut-shaped bulge, 16% a box-shaped bulge, 55% an elliptical bulge, and 25% a bulge whose shape is between boxy and elliptical. However, the better the resolution of the analysed images is becoming the more peanut-shaped bulges can be detected, since fainter structures become visible in more detail. Such a highly resolved image of NGC 4710 obtained by the Hubble Space telescope was published in a press release on the 18 Nov 2009 by spacetelescope.org. The image reveals that the bulge of this galaxy is indeed peanut-shaped on both sides while LDP classified only one side of the bulge as peanut-shaped and the other as box-shaped. The X-shaped structure which is building the b/p-shape of the bulge is eye-catching and is often not resolved in "older" images of b/p bulges. However, this structure is not surprising because it is known that bars of galaxies generate a resonant bending fed by vertical diffusion of orbits and instabilities. Simulations of barred galaxies confirm the existence of such X-structures. Therefore the b/p bulge of NGC 4710 is not as "baffling" as mentioned in the press release, but the image does indeed point out the importance of highly resolved images for detailed studies of morphologies of bulges which will help to understand their formation and evolution.

EP 3.31 Mo 17:45 AKM Foyer

Particletransport in incompressible turbulent plasmas — •Sebastian Lange and Felix Spanier — Lehrstuhl für Astronomie, Uni Würzburg, 97074

The interstellar medium (ISM), which is assumed to be turbulent, can be described as a plasma, following the magnetohydrodynamics (MHD). Within this work the MHD-equations are simulated using spectral methods. These simulations generate a turbulent plasma which energy follows the predicted kolmogorov-spectrum. In this plasma the movement of testparticles is analysed.

EP 3.32 Mo 17:45 AKM Foyer

Weak Turbulence in Astrophysics — •Felix Spanier[1] and Rami Vainio[2] — [1]Lehrstuhl für Astronomie, Universität Würzburg, 97074 Würzburg — [2]Dept. of Physics, University of Helsinki, Finland

In astrophysical jets, like in AGN, but also in the solar environment weak turbulence may play an important role due to the high background fields. The evolution of weak turbulence maybe best described by three-wave interaction. We present results from three-wave interaction studies in the kinetic and dispersive regime and their influence on the particle acceleration.

EP 3.33 Mo 17:45 AKM Foyer

Langzeitmessung der Ortsdosisleistung auf Flughöhen — •Thomas Möller im Namen der RAMONA Kooperation — Universität Kiel/IEAP, 24098 Kiel

Die Erde ist fortwährend einer energiereichen Teilchenstrahlung aus dem Weltall ausgesetzt. Diese kosmische Teilchenstrahlung bildet gemeinsam mit ihren Sekundärprodukten ein natürliches Strahlungsfeld in der Atmosphäre der Erde. Die damit verbundene natürliche Strahlenexposition des fliegenden Personals unterliegt in Deutschland gesetzlichen Regelungen. Zusätzlich zu der zeitlich relativ langsam variierenden galaktischen kosmischen Strahlung kann es im Zusammenhang mit solaren Teilchenereignissen zu kurzzeitigen Veränderungen des Strahlungsfeldes in der Atmosphäre kommen. Eines der wissenschaftlichen Ziele der RAMONA Kooperation ist die experimentelle Untersuchung der Auswirkung von diesen solaren Teilchenereignissen auf das Strahlungsfeld in Flughöhen. Aus diesem Grund sind im Rahmen von RAMONA mehrere Dosimeter in Passagierflugzeugen installiert, wobei angestrebt wird, dass sich immer mindestens ein Dosimeter in Flughöhen befindet. Als Dosimetersystem wurde NAVIDOS im Rahmen der RAMONA Kooperation entwickelt und eingesetzt, hierbei kommt das DOSimetrie-TELeskop DOSTEL als Strahlungsdetektor zum Einsatz. Das DOSTEL besteht aus zwei planaren Silizium-Halbleiterdetektoren, die in Teleskopgeometrie angeordnet sind. Es sollen erste Ergebnisse der Langzeitmessung mit dem NAVIDOS gezeigt werden.

EP 3.34 Mo 17:45 AKM Foyer

Quasistable radiation belt in the slot region — •Johannes Labrenz[1], Sönke Burmeister[1], Thomas Berger[2], Günther Reitz[2], Bernd Heber[1], and Rudolf Beaujean[1] — [1]CAU Kiel — [2]DLR Köln

MATROSHKA is an ESA experiment under leadership of DLR-Cologne. The radiation exposure inside a human phantom is measured by active and passive detectors. The DOSimetry TELescope (DOS-

TEL) was built at CAU Kiel in cooperation with DLR Cologne; it consists of two Si-semiconductor detectors forming a telescope. Count rates as well as energy deposit spectra are measured by this instrument. MATROSHKA is on board ISS since January 2004. The active instruments were operating during the first mission phase (MTR1) where the phantom was mounted outside the ISS from February 2004 to august 2005. In 2008 the active instruments were operating again in another mission phase (MTR2b). During (MTR2b) MATROSHKA was mounted inside the Service Module of the ISS. The DOSTEL measurements shows the expected transit through the inner radiation belt (SAA) over the South Atlantic and transits through the outer radiation belt at the highest magnetic latitudes. In Sept. and Oct. 2004 an additional radiation belt in the so called slot region appeared. In this work the measurements of this quasi stable slot region belt will be presented and compared to results of other experiments.

EP 3.35 Mo 17:45 AKM Foyer

Physikalische Voraussetzungen für einen Raumfahrtantrieb mit Schwerpunktversatz durch gegenläufige Präzession — •Peter Kümmel — Amselweg 15 c, 21256 Handeloh

Schwerpunktversatz bewirkt Bewegung und umgekehrt. Gegenläufige Rotation homogener Massen erzeugt Schwerpunktversatz orthogonal zur Verbindungslinie der zwei Rotationsachsen. Wegen der hohen Ausbreitungsgeschwindigkeit von Gravitation im Verhältnis zur Massenoberflächengeschwindigkeit kommt es nur zu sehr niedrigen Ablenkungswerten. Um eine entsprechend geringe Schwerpunktversatzstrecke zu vergrößern sind die homogenen Massen durch präzessierte zu ersetzen. Referenzliteratur: ISBNs 3 921 291-00-3, -01-1, -02-X, -03-8, -04-6, und -05-4