EP 11: Heliosphäre

Time: Thursday 9:30–11:00 Location: H46

Invited Talk EP 11.1 Thu 9:30 H46

Die Dicke der Heliosheath — •Martin Hilchenbach — Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau, Deutschland

An der Grenze unseres Sonnensystems, zwischen Sonnenwindplasma und der lokalen interstellaren Wolke, befindet sich der sogenannte Heliosheath. Ende des Jahres 2004 durchquerte die Raumsonde Voyager I den Termination-Schock, welcher die Überschallgeschwindigkeitsregion des Sonnenwindes von der Unterschallgeschwindigkeitregion des Plasmas in der Heliosheath trennt. Es wird angenommen, dass in dieser Region die Quellen für energetische, neutrale Atome sind, welche ihren Ursprung in Ladungstauschreaktionen von beschleunigten, energetischen Ionen und dem neutralen interstellaren Gas haben. Basierend auf den Voyager I Messdaten für energetische Ionen, dem energetischen Neutralteichenmessungen an Board der Raumsonde SOHO und aktuellen Modellen der Heliosphäre ist es möglich, die Dicke der Heliosheath abzuschätzen und die Plasmaphysik in den Grenzenregionen unseres Sonnensystems zu untersuchen.

EP 11.2 Thu 10:00 H46

Slow evolution of 2D magnetic potential fields in barotropic ideal MHD flows — •Dieter Nickeler and Marian Karlicky — Astronomical Institute AV CR Ondrejov, Fricova 298, 25 165 Ondrejov, Czech Republic

2D potential fields for modelling pre-flare magnetic field structures have already often been used in the literature. The equation of motion is often neglected as the plasma beta is assumed to be very small in the regions above the photosphere. In contrast to that we analyse how magnetic potential fields do evolve in the frame of barotropic ideal MHD flows. We show special solutions by solving the set of ideal MHD equations in the case of a quasi-static approach. This implies that the non-linear term in the equation of motion is neglected. Here neither the pressure gradient nor the equation of motion can be neglected, especially if one investigates this system of ideal MHD equation in the vicinity of a magnetic neutral point. We find the occurence of finite time singularities and instabilities, which can be regarded as precursors of reconnection and flare processes on the sun. This finite time singularities and instabilities in the vicinity of a singular point can also mark global instabilities of the counterflow regions of astrospheres, like our heliosphere.

EP 11.3 Thu 10:15 H46

Analytic relations between the upstream and downstream distribution functions of an ion plasma crossing an MHD shock — •Mark Siewert and Hans Jörg Fahr — Argelander-Institut für Astronomie, Auf dem Hügel 71, 53121 Bonn

MHD shocks dominate the vast majority of models aiming to describe physical processes in astrophysical plasmas. Usually, these shocks are described using a set of MHD jump conditions as functions of a few low-order velocity moments of the distribution function. However, in the presence of a magnetic field, these jump conditions are underdetermined, with the downstream pressure anisotropy usually taking the part of the missing parameter. Amining to arrive at a more precise description of the MHD shock, we have recently developed a Boltzmann-kinetic model of the shock transition region. Fully analytic relations between the upstream and the downstream plasma distribution functions are presented, as well as physical implications following from these results.

EP 11.4 Thu 10:30 H46

The Interplanetary Propagation Of Jovian Electrons — •Phillip Dunzlaff, Bernd Heber, Oliver Sternal, Reinhold Müller-Mellin, and Raul Gomez Herrero — Institut für Experimentelle und Angewandte Physik, Leibnizstrasse 11, 24118 Kiel, Germany

Since the early 1970's the Jovian magnetopshere is known as a steady source of relativistic electrons with energies of about 3-30 MeV. Since Jupiter can be treated as a point source, which is not central w.r.t the interplanetary magnetic field, it gives us the unique opportunity to study the propagation of MeV-electrons.

Observations of Jovian electrons by the COSPIN/KET-instrument aboard Ulysses confirmed earlier in-ecliptic results, that Corotating Interactions Regions act as effective barriers for MeV-electrons. In 2003 Ulysses approached the planet again at a distance of 0.8 AU.

In this contribution we compare the results from the first Jovian encounter with the one obtained during the second distance encounter. Especially the latitudinal dependence of Corotaing Interaction Region effects will be presented.

EP 11.5 Thu 10:45 H46

The Influence of the Interplanetary Magnetic Field on Particle Propagation in the Heliosphere — •Oliver Sternal[1], Bernd Heber[1], Adri Burger[2], Horst Fichtner[3], and Phillip Dunzlaff[1] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, Leibnizstr. 11/405, D-24118 Kiel, Germany — [2]School of Physics, North-West University (Potchefstroom Campus), 2520 Potchefstroom, South Africa — [3]Institut für Theoretische Physik,Lehrstuhl IV: Weltraum- und Astrophysik, Ruhr-Universität Bochum, D-44780 Bochum, Germany

The propagation of energetic particles in the vicinity of the Sun is described by the Parker transport equation. It includes the physical processes of diffusion, drift, convection and adiabatic energy changes. The modulation of the particle spectra can be modelled numerically and the solutions can be tested against the in-situ observations of spacecraft, e.g. IMP, SOHO or Ulysses.

One important part of the numerical simulations is the configuration of the heliospheric magnetic field. Since its exact geometry is still an open question, we study the effect of different magnetic field models on the particle propagation and compare our model results to Ulysses measurements.