EP 11 Heliosphäre: Voyager im Heliosheath

Zeit: Mittwoch 11:30–13:00 Raum: B

Hauptvortrag EP 11.1 Mi 11:30 B

Voyager im Heliosheath — •Bernd Heber — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität Kiel

Am 25 Mai 2005 berichtet der Nachrichtensender CNN. "Voyager has entered the final lap on its race to the edge of interstellar space, as it begins exploring the solar system's final frontier," Unter der Heliosphäre wird die weit in den interplanetaren Raum reichende Sonnenatmosphäre verstanden. Ihre Ausdehnung ist durch die Existenz des (lokalen) interstellaren Mediums begrenzt und reicht bis zu ˜94 Astronomische Einheiten (AE) weit in den interplanetaren Raum (1 AE = Entfernung Erde Sonne = $1,49\cdot 10ˆ{11}$m). Jenseits dieser äußeren Grenze, dem Termination Shock, schließt sich die Heliosheath an, den die Voyager 1 Sonde seit Ende 2004 erforscht. In meinem Vortrag werde ich neueste Messungen sowie ihre Konsequenzen für unser aktuelles Verständnis für die Physik der Heliosphäre diskutieren.

Fachvortrag EP 11.2 Mi 12:00 B

The shock with the solar wind termination shock: Still ahead of VOYAGER-1 — •Hans Joerg Fahr[1] and Sergei V. Chalov [2] — [1]Institut fuer Astrophysik und Extraterrestrische Forschung der Universitaet Bonn, Auf dem Huegel 71, 53121 Bonn — [2]Institute for Problems in Mechanics, Russian Academy of Sciences, 119526 Moscow (Russia)

The VOYAGER-1 prime investigators had recently declared that the NASA spacecraft VOYAGER-1 on December 16, 2004, at a solar distance of 94 AU has crossed over the solar wind termination shock and since that time is exploring the region of the heliosheath. Meanwhile, however, it became quite evident that intensities of anomalous cosmic ray particles (ACR*s) in the energy range larger than 0.5 MeV seen by VOYAGER-1 do unexpectedly continue to systematically increase with some smaller variations of a monthly period superimposed. Keeping to the conventional understanding of how and where ACR‘s are generated and accelerated, this intensity increase with increase of time and distance can only mean that the ACR generator, i.e. the termination shock, still is ahead of the VOYAGER spacecraft. With the help of classical ACR modulation theory we can give a conciliant and quantitative data interpretation deriving a shock location which is up to now always ahead of the spacecraft, however with variable differential distance. Depending on the absolute ACR intensities at the shock we can conclude that a shock passage of VOYAGER-1 will occur within the next quarter of a year.

Fachvortrag EP 11.3 Mi 12:15 B

Modulation in a Three-Dimensional Heliosheath — •Horst Fichtner[1], Langner Ulrich[2], Potgieter Marius[3], and Borrmann Thorsten[1] — [1]Ruhr-Universität Bochum, Institut für Theoretische Physik — [2]University of California, Riverside, USA — [3]Northwest University, Potchefstroom, South Africa

A three-dimensional model of the heliosphere is used to study the effects of the heliosheath on the modulation of cosmic ray protons. Using a sophisticated modulation model, the spectra of galactic and anomalous protons are computed for heliocentric distances ranging from 1 AU to 180 AU, i.e. well into the heliosheath. We discuss the effect of the large-scale structure of the heliosphere on these spectra and relate the findings to the measurements of the Voyager 1 spacecraft that has recently crossed the solar wind termination shock and is now performing in-situ measurements in the heliosheath.

Fachvortrag EP 11.4 Mi 12:30 B

Solar Activity Cylce in the Heliosheath — •KLaus Scherer[1] and Stefan Ferreira[2] — [1]Institut für Theoretische Physik, Lehrstuhl IV: Weltraum- und Astrophysik, Ruhr-Universität Bochum, D-44780 Bochum, Germany — [2]Physics, North-West University, 2520 Potchefstroom, South Africa

In recent years, a lot of effort was put in the modeling of the heliospheric structures in the Outer Heliosphere and their effects on cosmic ray transport. The interest has risen as Voyager 1 recently passed the solar wind termination shock. The latest development of dynamic heliospheric models showed that the variation in solar wind speed and number density due to the solar activity cycle caused density and pressure waves which moving downward into the tail direction. Because the solar wind speed during a solar activity cycle remains fairly constant in the ecliptic, this features are developing 35° above the ecliptic in upwind direction, but influence the plasma flow in the ecliptic tail direction. The time and latitudinal dependence of these features will be presented and discussed. Particularly, the compression ratio and injection rate at the termination shock, which are important parameters for the acceleration of anomalous cosmic rays, will be study, as well the polarity changes of the magnetic field in the heliosheath.

Fachvortrag EP 11.5 Mi 12:45 B

The International Heliophysical Year 2007: Activities in Germany — •B. Heber[1], R. Wimmer-Schweingr[1], H. Peter[2], K. Scherer[3], and F. Jansen[4] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität Kiel, Ohlshausenstr. 40, 24118 Kiel — [2]Theoretische Physik IV Ruhr-Universität Bochum, Universitätsstr. 150, 44801 Bochum — [3]Kiepenheuer-Institut für Sonnenphysik, Schöneckstr. 6, 79104 Freiburg — [4]Ernst-Moritz-Arndt-Universität Greifswald, Institut für Physik, Projekt Weltraum Wetter Warte, 17489 Greifswald

Fifty years after the International Geophysical Year (IGY) and 50 years of space exploration, the world's science community will again come together in 2007 for an international program of scientific collaboration: the International Heliophysical Year (IHY) 2007. The IHY has three primary objectives: (1) Advancing our understanding of the fundamental heliophysical processes that govern the Sun, Earth and Heliosphere. (2) Continuing the tradition of international research and advancing the legacy on the 50th anniversary of the International Geophysical Year . (3) Demonstrating the beauty, relevance and significance of Space and Earth Science. We will present the planed IHY 2007 activities in Germany for which we put the emphasis on the development of educational material, on public outreach, and on the initiation of future (inter)-national missions and research programs. Another aim of this talk is to motivate additional suggestions and activities within the IHY 2007. On the long-run the solar and heliospheric community should use the opportunity of the IHY to start a closer scientific collaboration within Germany.