EP 2 Erdmagnetosphäre

Zeit: Montag 15:30–17:15 Raum: B

Hauptvortrag EP 2.1 Mo 15:30 B

Höhepunkte der Cluster Mission nach 5 Jahren Betrieb — •Berndt Klecker — Max-Planck-Institut für extraterrestrische Physik, 85741 Garching, Germany

Die Cluster Mission mit ihren 4 Satelliten in polarer Umlaufbahn und variabler Tetraederkonfiguration gestattet seit nunmehr 5 Jahren die Untersuchung von Plasma- und Wellenstrukturen, sowie von Transport-, Heiz- und Beschleunigungsprozessen in verschiedenen Regionen des erdnahen Weltraums. Im Vordergrund stehen dabei Untersuchungen der Polregion der Magnetosphäre, der Magnetosheath, des Schweifs der Erdmagnetosphäre, sowie der Grenzschichten Magnetopause und Bugstoßwelle der Erde. Der Einsatz von 4 Satelliten mit identischer Instrumentierung gestattet dabei erstmalig die Unterscheidung zwischen räumlichen und zeitlichen Variationen, sowie die direkte Bestimmung von Größen wie Gradienten und Stromdichte aus den Multi-Satellitenmessungen. In diesem Vortrag wird eine Übersicht über einige der bisherigen Höhepunkte der Cluster Mission gegeben, wobei der Schwerpunkt auf neuen Ergebnissen aufgrund der Multi -Satellitenmessungen gelegt wird.

Fachvortrag EP 2.2 Mo 16:30 B

Concentrated generator regions observed by Cluster in the plasma sheet boundary layer — •Octav Marghitu[1,2], Maria Hamrin[3], Berndt Klecker[1], and Kjell Rönnmark[3] — [1]Max-Planck-Institut für extraterrestrische Physik, Garching, Germany — [2]Institute for Space Sciences, Bucharest, Romania — [3]Physics Department, Umeå University, Umeå, Sweden

Electric fields, **E**, associated with plasma motion, and diamagnetic currents, **J**, induced by pressure gradients, can sustain the conversion of mechanical into electromagnetic energy, $\mathbf{E} \cdot \mathbf{J} < \mathbf{0}$, in the plasma sheet boundary layer (PSBL). Observations by Cluster, at an altitude of about $18R_E$, supported by conjugated FAST data, measured around $0.6R_E$, indicate that concentrated generator regions (CGRs) are indeed present in the PSBL. We identify four CGRs during an event from September 19–20, 2001, when Cluster spends a few hours in the PSBL. These are, to our knowledge, the first *in situ* observations of generator regions in the magnetosphere. In order to provide additional arguments for the existence of the CGRs, we perform consistency checks based on the mechanical energy equation and on the Poynting theorem.

Fachvortrag EP 2.3 Mo 16:45 B

The dayside magnetopause in the spring of 2004: A case study and a statistical report from Cluster — •Adrian Blăgău[1,2], Berndt Klecker[1], Götz Paschmann[1], Manfred Scholer[1], Stein Haaland[1,3], Octav Marghitu[2,1], Iannis Dandouras[4], Lynn M. Kistler[5], and Elizabeth A. Lucek[6] — [1]Max-Planck-Institut für extraterrestrische Physik, Garching, Germany — [2]Institute for Space Sciences, Bucharest, Romania — [3]Department of Physics, University of Bergen, Norway — [4]CESR-CNRS, Toulouse, France — [5]Space Science Center, University of New Hampshire, Durham, USA — [6]Imperial College, London, UK

We discuss a case of dayside magnetopause crossing by Cluster during the spring of 2004. In that period, the trajectories are such that the exit from the magnetosphere in the northen hemisphere is usually at latitudes equatorward of the magnetic cusp. In order to infer its velocity, orientation and thickness, the transition was investigated by single-spacecraft and multi-spacecraft methods. We show results obtained by various techniques - like minimim-variance analysis of the magnetic field, discontinuity analysis and DeHoffmann-Teller analysis - and comment on their consistency. The outcome of these tests for the chosen event indicates that the magnetopause behaves like a rotational discontinuity. We also present a statistical report about the rotational versus tangential character of the dayside magnetopause encounters by Cluster during the spring of 2004.

Fachvortrag EP 2.4 Mo 17:00 B

Wave-Particle Coupling Upstream of Earth's Quasi-Parallel Bow Shock — •Arpad Kis[1], Klecker Berndt[1], Manfred Scholer[1], Elisabeth Lucek[2], Henri Rème[3], Iannis Dandouras[3], and Harald Kucharek[4] — [1]MPE, Garching, Germany — [2]Imperial College, UK — [3]CESR, Toulouse, France — [4]Univ. of New Hampshire, Durham

In the region upstream of Earth's quasi-parallel bow shock diffuse energetic particles are scattered in pitch-angle by low-frequency, large-amplitude MHD waves. On the other hand, these waves are excited locally by the energetic ions. The quasi-linar theory describing this intimate coupling between waves and particles has been verified in the past through observations, and the results show that the model predicts the transverse wave energy density in a satisfactory way. However, until now there has been no study of the relation between the observed and predicted wave energy density as a function of distance from the shock. We performed a detailed analysis of the upstream energetic particle event observed by Cluster on 18 February 2003. The results indicate that at distances less than 3 Re from the shock the observed transverse wave power energy density is substantially lower than the predicted one. We found that the compressional wave power energy density increases exponentially with decreasing distance from the shock. It is concluded that compressional waves in the close vicinity of the quasi-parallel shock play an important role by trapping the energetic diffuse ions.