

SPACE AND COSMIC RAY PHYSICS SEMINAR

University of Maryland
Computer & Space Sciences Building, Rm 2400
4:30 PM Monday, March 1, 2004
Tea & cookies 4:00-4:30 PM

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The Contribution of O^+ to Pressure and Current in the Stormtime Plasmasheet

During geomagnetically active times, the ionospheric contribution to the plasma sheet can be significant. Because of the larger Larmor radius of the O^+ ions, the motion of these ions is more likely to be non-adiabatic in the thin current sheets that are formed during substorms. The non-adiabatic ions then stream along the current sheet from dawn-to-dusk, in what are called "Speiser Orbits." It has been shown theoretically that there exist equilibrium models of thin plasma sheets where the cross-tail current is carried by the Speiser orbit particles, but this has never been tested experimentally. We have used CIS/CODIF from the CLUSTER satellites to first determine the contribution of H^+ and O^+ to the plasma sheet pressure during substorms, when the CLUSTER satellites are located close to the near-earth neutral line. We find that there are cases during storm-times when energetic O^+ (~ 30 keV) is the dominant contributor to the plasma sheet pressure. Examination of the distribution functions of these ions shows that they have the signatures of Speiser orbits. We have calculated the contribution of these ions to the cross-tail current. We find that while the contribution to the current from the Speiser orbit ions is significant, it is not the dominant contributor even during these extreme cases.

Sponsored by: Department of Physics, University of Maryland, and the Institute for Physical Science and Technology, University of Maryland. For information call Matthew Hill at (301) 405-6209 or go to the following website: http://space.umd.edu/seminars/Spring_2004_Seminar.html (A PDF file of this abstract is available for download at this URL.)

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