

SPACE AND COSMIC RAY PHYSICS SEMINAR

University of Maryland
Computer & Space Sciences Building, Rm 2400
4:30 PM Monday, October 6, 2003
Tea & cookies 4:00-4:30 PM

Dimitris Vassiliadis

Universities Space Research Association and
NASA Goddard Space Flight Center

Modeling the Dynamics of the Relativistic Electron Flux in Earth's Outer Radiation Belt

Acceleration and loss of the high-energy electron population occurs in a variety of processes which are continuously modulated by the solar wind and IMF. Estimates of the long-term activity are an important element of space weather and in particular LWS. On the other hand, the flux dynamics during individual storms are key to understanding the acceleration and trapping processes. We model the electron flux measured in solar cycles 22 and 23 by the instruments SAMPEX/PET, Akebono/RDM, Ohzora/HEP, and Polar/HIST. First, the long-term dynamic behavior is analyzed as a function of L shell, showing that the outer belt is divided in three regions of fairly different dynamics. Second, these regions are characterized by different responses to the solar wind and IMF inputs resulting in different types of electron storms. Representing the response with spatially distributed models and neural networks identifies its characteristic temporal and spatial scales. A similar approach is used to parametrize the response by geomagnetic activity indices. Internal dynamics, finally, which includes the effects of radial diffusion, local acceleration, convection, and losses, is represented by autoregressive models. These can be written as diffusion models for the flux. The relative contribution of input and internal parameters to the variance of the electron flux during storms is used to validate the composite model.

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/Fall_2003_Seminar.html

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