



Wednesday
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4:00 pm
Room 1017
Dow Building

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Unusual Narrow Radiation Rings Observed by Van Allen Probes

The Van Allen radiation belts consist of energetic electrons and ions at energies >100 keV trapped by the Earth's magnetic field. These very energetic particles may be harmful to satellite electronics and humans in space. In particular, relativistic electrons are responsible for deep dielectric charging in sensitive electronic components, causing frequent satellite failures and operational problems. An overview of radiation belt research starting from the discovery of the Van Allen radiation by Explorer 1 will be presented. Five decades after the beginning of the space age and the discovery of the trapped radiation, understanding the Van Allen radiation belts presents a major challenge. The dynamical evolution of the radiation belt fluxes results from the competition of various acceleration and loss mechanisms. Recent observations together with predictive and data assimilative modeling showed that energetic electrons can be accelerated to relativistic energies by taking energy from ULF and VLF plasma waves during resonant wave-particles interactions. Recent observations by NASA's Van Allen Probes showed an event where three radiation zones were observed at ultra-relativistic energies. The additional middle, and unusually narrow, belt persisted for approximately 4 weeks. We demonstrate that different physical processes are responsible for the formation of this unusual ring.

About the Speaker: Prof. Yuri Shprits studies the dynamics of the energetic particle populations. His research involves modeling, data assimilation, mission design, and modeling of the effects of radiation on satellites. He developed modeling and data assimilation tools that allow assimilation of 3D data from multiple spacecraft. He has quantified the effects of scattering by ELF/VLF/ULF waves. He is an author of over 80 peer-reviewed publications, and his h-index is 25. Prof. Shprits has been awarded the Arne Richter Award of the European Geosciences Union, Vienna, Austria in 2011 and Presidential Early Career Award for Scientists and Engineers in 2012 .