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Michigan Institute for Plasma Science and Engineering

Wednesday
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3:30 pm
Room 1005 EECS

Dr. Gian Luca Delzanno

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Active Space Experiments with Relativistic Electron Accelerators

In this talk I will discuss new space applications that are enabled by the recent development of compact, relativistic electron accelerators. First, I will describe a mission concept, called CONNection EXplorer (CONNEX), to connect magnetospheric physical processes to auroral phenomena. CONNEX is based on an electron beam fired from a magnetospheric spacecraft along magnetic field lines and optically imaging the beam spot in the ionosphere. The mitigation steps undertaken for the successful development of CONNEX will be discussed, with a particular focus on a scheme for mitigating critical issues of spacecraft charging induced by the electron beam. Second, I will discuss application of relativistic electron beams for radiation belt remediation. In this context, electron beams can excite plasma waves that can be exploited via wave-particle interaction to reduce hazardous fluxes of energetic particles to safer levels. I will also touch upon innovative numerical tools being used in support of these activities.

About the Speaker: Gian Luca Delzanno obtained his MS in Nuclear Engr. (1999) and PhD in Plasma Physics (2003) from Politecnico di Torino (PT) in Italy. After a postdoctoral position with the Burning Plasma Research Group at PT, in 2005 he moved to the T-5 Applied Mathematics and Plasma Physics Group at Los Alamos National Laboratory, initially as a postdoctoral associate and later as a technical staff member. His research interests are in theoretical and computational plasma physics. His work addresses development of numerical methods for multi-scale plasma physics simulations with application to space-physics. The latter include the SHIELDS project to develop global space-weather models of the near-Earth environment including substorm physics, the CONNEX project to study magnetosphere-ionosphere-coupling with relativistic electron beams, and wave-particle-interaction physics.