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POSTER ABSTRACTS

Colson, Andrew	***Statistical Analysis and Modeling of Record Ionosphere and Auroral Electron Spacecraft Charging Events*** Andrew Colson, NASA MSFC The Defense Meteorological Satellite Program (DMSP) spacecraft are a series of low-earth orbit (LEO) satellites whose mission is to observe the space environment using the precipitating energetic particle spectrometer (SSJ/4). DMSP satellites fly in a geosynchronous orbit at ~840 km altitude which passes through Earth's ionosphere. Satellites in LEO, such as DMSP, experience episodically charging events to frame potentials in the kilovolt range when exposed to space weather environments characterized by a high flux of energetic (~10's kilovolt) electrons in regions of low background plasma density. Statistical analysis of a set of extreme DMSP charging events are described varying in maximum negative frame potential from ~0.6 kV to ~2 kV which surpasses the highest recorded voltage in all previous studies. The goal is to focus on the characteristics of the charging events to understand how space weather impacts both spacecraft design and operations for vehicles on orbital trajectories that traverse auroral charging environments.
Glines, Forrest	***Simulations of Thermal Heating from Active Galactic Nuclei in Galaxy Clusters*** Forrest Glines, Michigan State University, USA Brian W. O'Shea, Michigan State University, USA G. Mark Voit, Michigan State University, USA Observations from the last decade have revealed the existence of cool-core clusters, galaxy clusters with a cooling time much shorter than the dynamical time. Recent work suggests that clusters may be thermally stable due a central heating mechanism such as an active galactic nucleus (AGN) that prevents cooling. Previous analytical work in one dimension has shown that thermal heating from a central AGN with a power-law radial profile, where the heating exceeds cooling at near and far radii but not in an intermediate region, may produce a stable cluster with an isentropic entropy profile in the core and an isothermal profile outside the cluster. To test this, we simulated idealized galaxy clusters using the ENZO code with thermal heating from a central AGN. Thermal heating as a function of radius was injected proportional to the radius to a fixed exponent in (-3,-2] for each run. Total thermal feedback was set equal to the total rate of cooling in the cluster. Thermal feedback with a conic angular dependence was also explored. However, the purely thermal feedback was not enough to achieve thermal stability and each simulation collapsed due to overcooling. These results support previous work showing that some kinetic feedback through a jet may be necessary for self-regulating AGN activity.
Marcello, Dominic	***Modeling Superluminous Supernovae with SuperNu*** Dominic Marcello, Louisiana State University, USA Ryan Wollaeger, Los Alamos National Laboratory, USA Wesley Even, Los Alamos National Laboratory, USA Manos Chatzopoulos, Louisiana State University, USA Many mechanisms have been proposed to explain the origin of superluminous supernovae (SLSNe). One such mechanism involves the interaction of an expanding supernova remnant with circumstellar material (CSM). We are modifying an existing code, SuperNu, to produce numerical models of the CSM interaction. SuperNu is a multi-group hybrid Implicit Monte Carlo (IMC) and Discrete Diffusion Monte Carlo (DDMC) code. It includes detailed modeling of atomic opacities, enabling it to produce line profiles suitable for comparison with observation. The present version assumes a homologously expanding shell of material, making it unsuitable for modeling the CSM interaction. Here we describe our efforts to modify SuperNu to include the hydrodynamics necessary to model the CSM interaction.

Pucci, Fulvia	***Energy Transfer and Electron Energization in Collisionless Magnetic Reconnection for Different Guide-Field Intensities*** Fulvia Pucci, NIFS, Japan and Princeton University, USA Shunsuke Usami, NIFS, Japan Hantao Ji, PPPL, US and Princeton University, USA Xuehan Guo, Tokyo University, Japan Ritoku Horiuchi, NIFS, Japan Shoichi Okamura, NIFS, Japan and NINS, Japan Electron dynamics and energization are a key component of magnetic field dissipation in collisionless reconnection. In 2D reconnection, the main mechanism that limits the current density and provides an effective dissipation is most probably the electron pressure tensor term, that has been shown to break the frozen-in condition at the x-point. In addition the electron-meandering-orbit scale controls the width of the electron dissipation region, where the electron temperature is observed to increase both in recent MMS observations as well as in laboratory experiments (MRX). By means of two-dimensional, full-particle simulations in an open system (Pei et al. 2001; Ohtani and R. Horiuchi 2009), we investigate how the energy conversion and particle energization depends on the guide field intensity. We study the energy transfer from the electromagnetic field to the plasma, and the threshold guide field separating when parallel and perpendicular energy transfers dominate, confirming recent MRX results, in agreement with MMS observations. We calculate the energy partition between fields and kinetic and thermal energy of different species, from the electron scales to ion scales, showing there is no significant variation for different guide field configurations. Finally we study electron distribution functions and self consistently evolved particles orbits for high guide field configuration, investigating possible mechanisms for electron perpendicular heating.