

Looking at Plasma Turbulence through a Microscope: Peering into the Smallest Scales of the Turbulent Cascade with Magnetospheric Multiscale

Plasmas throughout the Universe are filled with complex, highly nonlinear turbulent fluctuations that transfer energy from the large driving scales down to the smallest scales where energy can be most efficiently dissipated. In the absence of collisions, one of the key challenges is understanding how the multi-fluid and kinetic effects at scales below the characteristic ion and electron scales in the plasma shape the nonlinear dynamics and ultimately lead to energy conversion and dissipation of the turbulent fluctuations. Over the past nine years, NASA's Magnetospheric Multiscale (MMS) mission has provided us with one of the most detailed datasets for directly probing nonlinear turbulent dynamics at length and time scales well below the proton scales and approaching the electron scales. In this talk, I will discuss the insights that have been gained from the high-resolution measurements from MMS – with a particular focus on understanding the turbulent electric fields, as well as the role of small-scale turbulence-driven reconnection events and kinetic micro-instabilities embedded within the turbulent fluctuations. I will finally highlight several paths forward for building on the results of MMS both in terms of further probing electron-scale energisation and connecting the microphysics of collisionless turbulent plasmas to the large-scale evolution of space and astrophysical systems.

**Thursday, October 31st****3:30 - 4:30 p.m.****725 Commonwealth Ave | Room 502****Dr. Julia Stawarz****Northumbria University, Newcastle
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