Plasma Seminar
Friday, May 19 @ 1:00 PM
Physics & Astronomy Building (PAB) Room 4-330

Understanding Turbulent Heating in Space and Astrophysical Plasmas

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The flow of energy from the sun, through interplanetary space, to the magnetospheres of the Earth and other planets impacts the macroscopic evolution of the heliosphere, our home in the universe. Further afield, the evolution of many astrophysical environments is strongly influenced by the conversion of kinetic and magnetic energy into plasma heat. Plasma turbulence plays a key role in this process, mediating the conversion of the energy of large-scale fields and flows to plasma heat. But our understanding of how turbulence governs energy transport and plasma heating remains incomplete, representing a grand challenge problem in heliophysics. Further complicating matters is the fact that the typically low-density and high-temperature conditions dictate that the turbulent dynamics is weakly collisional on the length scales at which the turbulent energy is removed, requiring the application of kinetic plasma theory to follow the evolution and dissipation of the turbulence. Here I will outline the frontier of efforts to understand how kinetic turbulence in space and astrophysical plasmas leads to plasma heating and particle energization, exploiting a combined approach using kinetic plasma theory, supercomputer simulations, spacecraft measurements, and even laboratory experiments.