



SPACE PHYSICS SEMINAR

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The Solar Wind and Development of Solar Probe Plus

Thursday, April 10, 2014

725 Commonwealth Ave.

Refreshments at 3:30pm in CAS 500

Talk begins at 4:00pm in CAS 502

Abstract:

The supersonic flow of plasma outwards from the solar corona, known as the solar wind, was first observed at the dawn of the space age, yet the precise mechanisms leading to the heating and acceleration of the wind are still unknown. Through modeling and remote observations researchers have been able to discern that the heating and acceleration take place primarily below about 20 solar radii through any number of processes such as ion-cyclotron resonant heating or dissipation of turbulent fluctuations. The Solar Probe Plus (SPP) mission is designed to provide insight into this issue by directly measuring the plasma environment in the region of interest (specifically down to 10 solar radii). The SWEAP (Solar Wind Electrons, Alphas, and Protons) investigation is a suite of instruments on-board SPP designed to measure the thermal ions and electrons that make up the solar wind. The suite consists of two electrostatic analyzers (ESAs) that measure electrons, an ESA that measures ions, and a Faraday Cup that measures electrons, protons, and alphas. In order to address the primary objectives of the mission, the Faraday cup must be pointed directly at the Sun throughout the full solar encounter. The resulting extreme operating environment presents complex engineering challenges that must be overcome to meet the stringent measurement requirements of the mission. This presentation will review the outstanding scientific issues to be addressed by SPP, introduce the mission and spacecraft, and then discuss the novel approaches taken to design, build, and test a working prototype of the SPP Faraday cup.