

Thursday, April 14th
3:30pm – 4:30pm
Barnard Hall 103

The Shape of the Wind: Discovering Magnetic Topology Throughout the Heliosphere

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Abstract:

Plasma and energy transfer throughout the solar system is constrained and influenced by the magnetic structures, whether they originate from the sun, planetary magnetospheres, or interactions at the interfaces between the two. Studying the shape of the heliosphere and the magnetospheres within is one path to constrain the energy flow and transfer on all scales. By examining the magnetic alignment of strahl, or magnetic-field aligned, low-energy electrons within the solar wind, we can identify whether regions of solar wind and magnetospheric plasma are connected to the sun, magnetospheres, or both simultaneously. This talk will cover how recently launched missions, such as Parker Solar Probe in the inner heliosphere, as well as missions currently in development, such as ESCAPEDE bound for Mars, are leveraging critical electron measurements of magnetic topology to characterize the flow and transfer of energy from their sources on the sun to smaller scales via features such as solar wind turbulence and magnetic switchbacks. Via comparison with heliospheric magnetic field modeling, the Parker Solar Probe / SPAN-E electron experiment is making definitive connections between large scale structures, such as the heliospheric current sheet and sources of fast and slow wind, with photospherically observable regions on the sun such as coronal holes and acceleration regions. In the future, the ESCAPEDE e-EESA instruments will be able to identify the extent to which the solar wind is eroding the Martian atmosphere via interactions with its hybrid magnetosphere. Additionally, the recently selected HelioSwarm mission will host an entirely student-designed low-energy electron instrument that will definitively determine when this mission is within the pristine solar wind in order to study solar wind turbulence. The ability of these three missions to operate together in tandem and also with others as a topological observatory will be discussed.

Host: John Sample

** Refreshments served in the Barnard second floor atrium at 3:00 p.m. **