Geophysical Research Abstracts
Vol. 21, EGU2019-11837, 2019
EGU General Assembly 2019

A Predicted Small and Round Heliosphere

Merav Opher (1), Abraham Loeb (2), James Drake (3), and Gabor Toth (4)

(1) Boston University, Astronomy, Boston, United States (mopher@bu.edu), (2) Harvard University, (3) University of Maryland, (4) University of Michigan

The shape of the solar wind bubble within the interstellar medium, the so-called heliosphere, has been explored over six decades (Davis 55; Parker '61; Axford '72; Baranov & Malama '93). As the Sun moves through the surrounding partially-ionized medium, neutral hydrogen atoms penetrate the heliosphere, and through charge-exchange with the supersonic solar wind, create a population of hot pick-up ions (PUIs). The Voyager 2 (V2) data demonstrated that the heliosheath pressure is dominated by PUIs. Here we use a novel magnetohydrodynamic model that treats the PUIs as a separate fluid from the thermal component of the solar wind. Unlike previous models, the new model reproduces the properties of the PUIs and solar wind ions based on the New Horizon (McComas et al. 2017) and V2 (Richardson et al. 2008) spacecraft observations. The model significantly changes the energy flow in the outer heliosphere, leading to a smaller and rounder shape than previously predicted, in agreement with energetic neutral atom observations by the Cassini spacecraft (Dialynas et al. 2017). We will discuss the consequences of this new shape for draping of the interstellar magnetic field and conditions at Voyager 1 and 2 in the local interstellar medium.