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Remote Sensing the Plasma Flows Around the Heliopsheath and Consequences for the Shape of the Heliosphere.

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Remote sensing IBEX observations of the interstellar gas flow in the inner heliosphere provide the most detailed information about the physical conditions of the surrounding interstellar medium and the interaction of this flow with the heliosheath. An excellent diagnostic tool to probe this interaction is the secondary component of the interstellar neutral gas flow that originates from charge exchange between primary interstellar neutrals and the plasma at the heliosheath. The interstellar plasma is diverted around the heliosphere, and the neutrals that are emitted from this flow through charge exchange carry information on the diverted flow. Therefore, IBEX-lo sky maps of secondary neutral He and O fluxes contain information on the interstellar plasma flow patterns and thus the shape of the heliosphere. We use asymmetries apparent in these flux maps to infer flow patterns around the heliosphere. With a theoretical model which is based on Hydro-Dynamic (HD) considerations we determine the global shape of the heliosphere. With this approach, it is likely to confirm or disprove current model predictions that are solely based on theories.
Further, these asymmetries in sky maps at varying energies contain spectral information which may allow us to investigate regions of plasma heating and acceleration. Thus, we demonstrate a new and powerful tool for the remote sensing of plasma flows in the heliosheath. This approach is highly relevant for the upcoming IMAP mission because it will allow us the obtain more accurate measurements and thus a more accurate understanding of the flow and thus the shape of the heliosphere.