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# The Smallest Magnetosphere as a Model for the Largest: Inferred Orientation of B in the LISM

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The symmetry of energetic neutral atom (ENA) emissions from the heliopause reported from data acquired by the IBEX spacecraft can be used to infer properties of the interaction of the local interstellar medium (LISM) with the heliosphere. The symmetry center of the band of intense emissions is not at the nose of the heliosphere, defined by the direction of motion of the Sun relative to the LISM, and the extent of the region of intense emission is energy-dependent. Recent observations [McComas et al., 2012] indicate that the flow of the LISM onto the heliopause is sub-magnetosonic, therefore resembling the flow upstream of Ganymede more closely than the flow upstream of planets embedded in the solar wind. Features of the structure and interaction at Ganymede may closely parallel the structure of the heliosphere, and we believe that the analogy is instructive. A magnetohydrodynamic simulation shows that the region in which magnetic reconnection occurs in a Ganymede-like magnetosphere forms a belt that, for an appropriately selected upstream field orientation, has a form close to that observed for the ENA emissions by IBEX and Cassini. The shift off of the equatorial plane of the region of high reconnection rates requires a finite component of the upstream field along the flow direction (as inferred by McComas et al. for the interaction with the LISM). The symmetry does not establish the sense of the field, which remains ambiguous. However, Voyager 2 measurements [Burlaga and Ness, 2011] show that the field in the vicinity of the heliopause has been systematically oriented as in an “away” sector; i.e. the sector structure has disappeared as Voyager 2 has moved outward. If the emissions are produced by nearly continuous reconnection in a sub-Alfvenic flow, the ambiguity of the sense of the field of the LISM can be eliminated. Reconnection may also provide an explanation of the energy-dependence of the ENA signatures. We will also point out that the sub-Alfvénic flow of the LISM implies not only that there is no bow shock standing upstream of the heliopause [McComas et al., 2012], but also that the large-scale configuration of the heliopause is likely to differ from the bullet-shape frequently pictured. We will use the Ganymede example to demonstrate the structure anticipated.