



The “Ribbon” in the Sky Maps of IBEX: Theoretical Considerations and Numerical Simulations.

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IBEX, the Interstellar Boundary Explorer, was launched in October 2008. It consists of two major Energetic Neutral Atom (ENA) detectors IBEX-hi (0.38-6keV) and IBEX-lo (0.01-2keV). Mid of 2009 IBEX finished its first full sky map in the light of Energetic Neutral Atoms (ENAs). After detailed data analysis these sky maps revealed a large-scale structure which was unexpected and not predicted in any of the models prior to IBEX launch. This large-scale structure called “the Ribbon” is now under intensive investigation and first model attempts try to explain its location in the sky and its possible formation. In this presentation we will present a model for the Ribbon, which is not only based on IBEX-hi and IBEX-lo observations but also includes previous Voyager observations, and theoretical/numerical considerations. A close look at the data shows that the peak energy of the Ribbon is located at 1keV, which strongly indicates a close association with the charged ions in the solar wind. Furthermore, this Ribbon shows fine structure and there is strong indication of temporal variations. Our model consists of two components: a static component whose source is deeper in the heliosheath, and a dynamic component. We propose that backstreaming/reflected solar wind ions charge exchange with interstellar neutral atoms and thus form a major source of the observed ENA flux which then forms the Ribbon. Backstreaming ions are observed with Voyager and this component could explain the time variability and the fine structure of the Ribbon observed by IBEX. We also performed numerical simulations that provide a deeper insight into the formation of the Ribbon-like structure.