Observing the Outskirts of the Heliosphere: The Interstellar Boundary Explorer (IBEX) Mission

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***Abstract*. The Interstellar Boundary Explorer (IBEX)[1] is a NASA Small Explorer that was launched on October 19, 2008. IBEX's sole, focused science objective is to discover the global interaction between the solar wind and the interstellar medium. IBEX achieves this objective by taking a set of global energetic neutral atom (ENA) images that answer four fundamental science questions: 1) What are the global strength and structure of the termination shock?; 2) How are energetic protons accelerated at the termination shock?; 3) What are the global properties of the solar wind flow beyond the termination shock and in the heliotail; and 4) How does the interstellar flow interact with the heliosphere beyond the heliopause? ENAs are created in the heliosheath when interstellar neutrals give up an electron to a slowed and heated solar wind or pick-up ion. Some of the newly-created ENAs are pointed at the inner heliosphere where they can be detected by IBEX in Earth orbit.**

IBEX is in a highly elliptical Earth orbit with an apogee of more than 50 R_E, which allows IBEX to spend $\sim$ 7 days of its $\sim$ 7.6 day orbit outside the magnetosphere and its high background of ENAs.

IBEX has two large single-pixel cameras: IBEX-Lo[2] with ENA measurements from $\sim$ 10 eV to 2 keV, and IBEX-Hi[3] with measurements from $\sim$ 300 eV to 6 keV. Note that these energy ranges include substantial overlap. Both cameras have angular resolution of $\sim 6.5^\circ \times 6.5^\circ$, which gives about 1800 pixels covering the entire sky. In addition, IBEX-Lo include eight energy channels and IBEX-Hi includes six, This will give energy spectral information at each pixel in the sky map.

IBEX's first global views of the solar system's interstellar boundaries will unveil the physics of the heliosphere's interaction with the interstellar medium and provide a deeper understanding of the heliosphere and, by extension, astrospheres throughout the galaxy. It is also important because this interaction greatly reduces the amount of dangerous cosmic radiation that reaches the Earth.

***Keywords*: heliosphere heliosheath neutrals**

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