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Observations of the Very Local Interstellar Medium with the IBEX and Voyager Spacecraft

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The Interstellar Boundary Explorer (IBEX) is an Earth-orbiting spacecraft equipped with two single-pixel cameras that detect neutral atoms produced by the interaction of the solar wind (SW) with the very local interstellar medium (VLISM), as well as neutral atoms flowing in from the VLISM itself. After its launch in 2009, IBEX discovered the unexpected existence of the “ribbon,” a nearly circular arc of enhanced hydrogen ENA flux at \sim keV energies. The enhanced ribbon fluxes are believed to originate from look directions perpendicular to the local interstellar magnetic field draped around the heliosphere. A comparative analysis of ribbon flux simulations with IBEX data derived a “pristine” interstellar field strength of $\sim 3 \mu\text{G}$ just beyond the influence of the heliosphere, directed towards $\sim (26^\circ, 50^\circ)$ in galactic longitude/latitude. IBEX observations complement the only in situ observations of the VLISM made by the Voyager 1 spacecraft. Since crossing the heliopause in August 2012, Voyager 1 has been measuring the VLISM plasma properties, including the galactic cosmic ray flux, (indirectly) the compressed interstellar plasma density, as well as the interstellar magnetic field draped around the heliosphere. This talk will review key IBEX and Voyager observations that inform us of the VLISM environment, in particular the local interstellar magnetic field, which is important for understanding the galactic cosmic ray fluxes observed at Earth.

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