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Voyager Observations in the Outer Heliosphere and Interstellar Medium

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The Voyager 1 spacecraft is now in the local interstellar medium (LISM). Voyager 2 is in the heliosheath, the region of shocked solar wind after the termination shock, and is approaching the heliopause. At the heliopause, the boundary between the solar wind and the LISM, galactic cosmic ray (GCR) intensities and the magnetic field magnitude increased and the anomalous cosmic ray (ACRs) and lower-energy particle intensities dropped to background levels. The complex structure of the heliopause region will be described. We show that Voyager 1 and 2 have observed very different heliosheath plasma flows and particle profiles upstream of the heliopause.

GCRs are modulated by the heliosphere; the Voyager data provide the first direct observations outside this modulation region. We show the GCR spectra and abundances in the LISM and compare to model predictions. It has been hypothesized that some modulation occurs outside the heliopause; we will show the latest intensity gradients in this region. The transport of GCRs is affected by the magnetic field turbulence and we will show the first direct measurements of the field in the LISM.

Before Voyager, ACRs were thought to be accelerated at the termination shock. Lower energy particles were accelerated at the shock, but the ACRs were not. The peak in ACR intensities was observed about 15 AU beyond the shock. We discuss several mechanisms which could accelerate these particles.

Summary

We discuss Voyager observations in the outer heliosphere and interstellar medium emphasizing energetic particle data.

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