AOGS 2006

Implications of Heliosheath Magnetic Draping and Density Turbulence for the Source Region and Propagation of the 2-3 KHZ Radio Emissions

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It is now widely accepted that the 2-3 kHz emissions observed by the Voyager spacecraft originate just beyond the nose of the heliopause. A well-developed theory exists involving radio emission near the electron plasma frequency upstream of the shock wave leading a global merged interaction region, shock acceleration of an enhanced superthermal electron tail in the outer heliosheath, and acceleration of the tail electrons by lower hybrid waves driven by pickup ions. The lower hybrid process depends sensitively on the ratio of the pickup ion ring speed to the Alfven speed. The radiation must propagate into the inner heliosheath and then the heliosphere to be observed by the Voyagers. Here, two aspects are presented of ongoing research. The first involves theoretical calculations of magnetic draping over the heliopause, and associated changes in Alfven speed and constraints on the source region. They predict that the source is beyond the heliopause nose, the lower hybrid process should proceed, and the source shape should be a band on the sky. Second, the radiation's propagation is investigated using ray tracing calculations. The ray tracing analyses predict that significant scattering of radiation by density turbulence in the inner and outer heliosheaths is required for the radiation to reach the Voyagers.