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Plasma Instrumentation for Spaceflight Missions

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Plasma measurements are an important part of spaceflight missions that seek to understand the formation and evolution of our solar system. Instrumentation has been designed for a wide variety of environments and measurement goals. We have developed plasma instrumentation that will fly within 9 solar-radii of the surface of the sun on NASA's Solar Probe Plus Mission. At the other extreme, we developed an instrument to measure the tenuous solar wind around Pluto at the edge of our solar system for the New Horizons Mission. At Earth, the Magnetospheric Multiscale Mission employs four spacecraft flying in formation to study magnetic reconnection on a global scale making measurements at unprecedented rates. While at Jupiter, the Juno Mission makes an in-depth study of Jupiter's polar magnetosphere to measure the effect of the precipitating particles on Jupiter's ionospheric layers, to determine the composition and structure of the field-aligned currents, and to understand the mapping of these currents to the outer magnetosphere and other parts of the Jupiter system. The instrumentation developed for these measurements spans a broad range of energies from a few 10's of eV up to 100's of MeV. A wide variety of techniques and sensor technologies are employed to make the measurements, sometimes requiring special shielding and coincidence techniques to reduce background from the harsh space environment.

Eligible for student paper award?

No

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