

## **MOONS AND RINGS AND THE PLASMAS OF THEIR ENVIRONMENTS**

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As data accumulate on the properties of moons and rings at the outer planets, it is useful to reflect on the history of the subject, a history that goes back half a century. The interaction of Earth's moon with the plasma in which it is embedded was the first to be characterized by spacecraft. It is worth noting that we learned not only about flow onto a non-conducting body and how to identify inductive responses as a way of probing a moon's interior but also tested theories of magnetic reconnection by examining the fluxes of charged particles surrounding the Moon in the terrestrial magnetotail. Jupiter's rings were identified indirectly by anomalies in particle fluxes in the Pioneer 11 data. Next Voyager's flyby of Io gave hints of the nature of the MHD interactions with conducting bodies. Galileo opened our eyes to even more dramatic ways in which magnetic field measurements can be used to probe interiors and entertained us by finding a magnetosphere embedded within a magnetosphere. In the Cassini era, the detailed analysis of particles and fields data has become prominent as a tool for identifying moons as sources and sinks of plasma. The Enceladus plume, first inferred from magnetometer data, accounts for much of the plasma content of the magnetosphere and serves as the source of the E-ring. Some special cases will be used to illustrate aspects of the coupled systems of interest.

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