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An Overview of Plasma Observations at Saturn and Titan

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The Cassini Plasma Spectrometer (CAPS) makes comprehensive measurement of ion energy and mass from 1 eV to 50 keV and electron energy from 1 eV to 28 keV. This paper gives an overview of data taken during the first nine Cassini orbits, including the closest approach to the rings during the tour, three close flybys of Titan, a close flyby of Enceladus, and several passes through the inner magnetosphere of Saturn. We also report on a number of dedicated studies of the interaction of the solar wind with the magnetosphere and studies of the bow shock and magnetopause boundaries. Our initial analyses indicate a very dynamic magnetosphere with boundaries ordered both by plasma bulk parameters and composition. We summarize here observations of plasma injection and drift in the middle magnetosphere, the composition of plasmas in the magnetosphere and over the rings, and the interaction of the magnetosphere with Titan's ionosphere.