



Surface Charging of Saturn's moon Rhea

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Abstract

Saturn's second-largest moon, Rhea, resides within the planet's magnetosphere, and is continuously exposed to the magnetospheric plasma population. We report on Cassini Plasma Spectrometer (CAPS) observations made during the Cassini spacecraft's close encounters with Rhea on March 2, 2010, and January 11, 2011; these demonstrate the fascinating physical processes that occur near solid body surfaces.

During the flybys, Cassini passed a few tens of kilometres of the north and south polar regions of the satellite, respectively. The CAPS Electron Spectrometer, ELS, had good pitch angle coverage during the encounters, with its 8 anodes covering directions from towards, to away from the moon. CAPS-ELS observed the expected decrease in the high energy electron population caused by their absorption by Rhea, but also observed an enhancement in the population of electrons at energies below a few hundred eV.

We present our interpretation of this population as being associated with the surface charging of Rhea. At the time of both encounters, the moon's surface was negatively charged, meaning it could reflect certain incoming electrons before they struck the ground, and could also accelerate low energy electrons liberated near the surface. Implications of the observations are discussed.

