



Heavy Ions Near Saturn's Rings

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During Saturn orbit insertion on July 1, 2004, Cassini passed $\sim 0.2 R_s$ over the main rings and, during the ring plane crossing, through the neutral torus. The ion mass spectrometer (IMS), a component of the Cassini plasma spectrometer (CAPS), observed ion flux during this ring plane crossing whenever the instrument viewing was into the co-rotation direction. This occurred in two time intervals, the first over the main rings from about 03:36 to 03:58 UT (interval 1) and the second in the neutral torus from about 04:14 to 04:48 UT (interval 2). The interval 1 data over the main rings show fluxes of both O^+ and O_2^+ , as has been previously reported. Here, we review the identification of these species using CAPS time-of-flight analysis and show that the total ion density compares favorably with the electron density obtained via analysis of radio and plasma wave science (RPWS) data. At $\sim 0.2 R_s$ over the main rings in interval 1, densities of O^+ and O_2^+ range from $\sim 0.1 \text{ cm}^{-3}$ to $\sim 1 \text{ cm}^{-3}$ and temperatures of both species are $\sim 1 \text{ eV}$. CAPS ion data obtained in the neutral torus, less than $\sim 0.1 R_s$ distance from the equatorial plane, are consistent with two distinct species having mass per charge of near 16 and 32, e.g. O^+ and O_2^+ . Both species are denser (~ 20 to 60 cm^{-3}) and hotter (~ 5 to 15 eV) than seen over the main rings, with the total ion density again comparable to the RPWS electron density. In addition, on March 29-30, 2005, and April 14-15, 2005, additional CAPS data, mostly at radial distances of the E ring rather than the main rings, are anticipated; analysis of these ion observations will be presented at the meeting.