

# Longitudinal and Temporal Variations in the Io Plasma Torus During the Cassini Jupiter Flyby

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The Cassini Ultraviolet Imaging Spectrograph (UVIS) obtained several thousand 2-D spectrally dispersed images of the Io torus during the Jupiter flyby. We use a “cubic centimeter” spectral emissions model to derive electron temperatures and densities and ion mixing ratios from the UVIS spectra. We find relatively minor variations ( $\sim 5\%$  amplitude) of the torus brightness and electron temperature with System III longitude when averaged over a 44-day period during the inbound leg of the flyby (1 Oct 2000–14 Nov 2000). The peak in brightness of the torus ansa occurred near  $\lambda_{\text{III}}=110^\circ$  while the peak in torus electron temperature occurred near  $\lambda_{\text{III}}=40^\circ$ . The magnitude of the temperature variation is consistent with that found by the analysis of Voyager UVS spectra by Herbert and Sandel (2000), but the phase is offset by  $\sim 160^\circ$ . In contrast to the long-term longitudinal variations, we find variations of almost a factor of two in the composition and electron temperature of the torus plasma over one Jovian rotation. Both the magnitude and the phase of these strong longitudinal variations are observed to change with time. The change in phase is not consistent with plasma that is lagging behind the corotation velocity by  $\sim 3\%$  i.e. subcorotating at System IV.