Understanding Jupiter's radiation belts through observations of the Jovian Synchrotron Radiation

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Jupiter's synchrotron radiation has been observed extensively over the last couple decades using primarily single dish operating at 2295 Mhz to provide time variability and intensity information antennas (Klein et al, 1989) and occasionally using the VLA operating at 1400 Mhz to obtain spatial distribution maps (de Pater and Jaffe, 1984). The study of the synchrotron radiation characteristics and variations has provided substantial insight into the physical properties and processes of Jupiter's inner radiations belts. During 1994 a more intensive program was initiated to obtain data during the impacts of Comet SL-9 with Jupiter. The synchrotron radiation variation associated with the comet impacts include an emission intensity increase dependent on wavelength, longitudinal beaming curve distortions and a flationing of the latitudinal beaming curve. The observed changes have resulted in numerous theories on the responsible processes including pitch angle scattering by impacted stimulated plasma waves, increases in radial diffusion rates and/or the shock acceleration of electrons. The characteristics of the emissions will be reviewed along with a discussion on possible interpretations of the observed Comet SL-9 associated variations mentioned above.