FOURIER TRANSFORM SPECTROSCOPY AT JUPITER AND SATURN

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The Cassini spacecraft will arrive at Saturn on July 1, 2004 carrying the Composite Infrared Spectrometer (CIRS), to begin four years observing the composition and thermal structure of the planet, rings and moons. Of particular interest will be the atmospheres of Saturn and Titan. CIRS observed Jupiter for six months during 2000-2001 as Cassini flew by that planet. During the scientific investigation at Jupiter all modes of operation were tested in preparation for the tour of the Saturn system. Molecular and continuum emissions were mapped globally together with vertical and horizontal temperature structure. Time variable hydrocarbon enhancements were seen in both the Northern and Southern auroral regions. Distributions of carbon dioxide and hydrogen cyanide were related to the 1994 comet Shoemaker-Levy impacts. CIRS combines two Fourier transform spectrometers: 1) a far-infrared polarizing interferometer covering 17-1000 mm with a pair of detectors, and 2) a mid-infrared, conventional interferometer covering 7-17 mm with two 10-element detector arrays. Both spectrometers record spectra with apodized resolutions from 0.5 to 15.5 cm^{-1}. The Jupiter encounter proved invaluable in development of the pipeline data processing, calibration, archiving and retrieval architecture that will be required to handle the large volume of data to be collected at Saturn.