

Doppler Imaging Observation of Io Plasma Torus : Development of the Instrument and Data Reduction Technique II

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Ions originated from volcanic eruption on Jovian satellite Io form the plasma torus along Io's orbit. Emission intensities of sulphur ions (SII : 671.6, SII673.1) are strong enough to be observable from the earth. If we measure line widths and Doppler shifts of these emission lines, we can derive temperatures and velocities along a line of sight of emitting ions, and such observation is expected to greatly contribute to understand the physical processes taking place in the Jovian magnetosphere.

We are now developing a new Fabry-Perot imager, which will enable us to measure the spatial distribution of such Doppler quantities as well as the distribution of emission intensity. The instrument, which employs an etalon of 50mm aperture with a spacing of 0.5mm and an interference filter as a pre-dispersive element, will be set up at the Coude focus of the 60cm refracting telescope and covers a field of view of 13 arc minutes (roughly 40 Jovian radii). The free spectral range of the instrument is 0.45nm and designed to attain measuring less than 2km/sec Doppler shifts of the emission lines. The etalon gap is continuously monitored from the stabilized He-Ne laser fringe and Piezo scanning of the servo stabilized FP etalon is possible.

In advance of observation using this instrument, we have developed a controlling system for monitoring and scanning the etalon gap, and CCD data acquisition by using PC. Initial instrumental tests, such as the etalon scanning operation and the response of etalon spacing to temperature variations, have been performed. The proper observation mode will be discussed based on the results of initial evaluation of the instrument. Preliminary observational results may be presented.