Simulation of deriving Doppler quantity distribution in Io plasma torus using an imaging Fabry-Perot spectrometer

Masato Kagitani[1], Shoichi Okano[2], Takeshi Sakanoi[3]

[1] PPARC, Tohoku Univ, [2] PPARC, Tohoku Univ., [3] PPARC, Grad. School of Sci., Tohoku Univ.

Ions originated from volcanic eruption on Jovian satellite Io form plasma torus along Io's orbit. Emissions of sulphur ions are strong enough to be observable from the ground. Observation of Doppler quantities of such emission lines is expected to greatly contribute to understand the the Jovian magnetosphere.

We are now developing a new Fabry-Perot spectrometer which will enable us to measure such Doppler quantities as well as distribution of emission intensity. In advance of observation using this spectrometer, we are developing a method for deriving Doppler quantities from simulated data taking instrumental parameters into account. We will present results of the simulation along with the method to obtain distribution of Doppler quantities by scanning the etalon gap.

Ions originated from volcanic eruption on Jovian satellite Io form plasma torus along Io's orbit. Emission intensities of sulphur ions (SII6716, SII6731, SIII9531) are strong enough to be observable from the ground. If we measure widths and 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 spectrometer which will enable us to measure spatial distribution of such Doppler quantities as well as 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, images a field of view of 13 arc minutes (roughly 40 Jovian radii). Piezo scanning of the servo stabilized FP etalon is possible. The optics is designed to have the maximum angle of 2.66 degree from opticl axis for the parallel beam passing through the etalon.

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