

DOPPLER IMAGING OBSERVATION OF [SII] EMISSION IN IO PLASMA TORUS – PRELIMINARY RESULTS OF OBSERVATION AT HALEAKALA

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Plasma originated from volcanic eruption on Jovian satellite Io forms a donut-shaped region of dense plasma along Io's orbit, which is called Io plasma torus (IPT). Spectral line emission from singly charged sulfur ions, [SII], at 671.6 nm and 673.1 nm in IPT is strong enough to be observable from the ground. Imaging observation of sulfur ion emission with sufficient spectral resolution enables us to monitor two-dimensional distributions of ion temperatures, line-of-sight velocities of ions, and emission intensity, and thereby it provides information on mass loading in IPT.

In order to attain such purpose, we have developed an imaging Fabry-Perot interferometer (IFPI) for continuous observation of Io plasma torus. The IFPI is coupled to a 60-cm Coude telescope of our Iitate observatory (37.7N, 140.7E). Fabry-Perot etalon of the IFPI is characterized by wavelength resolution of 0.011nm and finesse of 40 at 671.6 nm. Using the IFPI, we carried out observation of IPT in 2003 and the results showed that the ion velocity is larger than the corotation speed by 7km/s at maximum. This value is larger than previously reported largest value of 4km/s. Enhanced mass loading due to increase of volcanic activity may be possible, or otherwise mass loading is increased in a limited Io phase angle range. It is difficult to study further because our data set of 2003 is limited to an Io phase angle range of 210 degree to 30 degree.

Further observation of IPT is planned at Haleakala, Hawaii using the IFPI coupled to a 35cm telescope in February and March 2004 in order to obtain distribution of slowing down of the ion velocity from IPT corotation. Preliminary results of the observation will be presented.