

The feasibility study of the EUV spectroscopic observation for the Io plasma torus from the Earth-orbiting satellite, EXCEED

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The Io plasma torus is composed mainly of sulfur and oxygen ions and their compounds ejected from the Io's volcanoes, together with a background of electrons. In addition to those basic components, several in-situ observations have shown that a few percents of the electrons there have been excited to be as much as 100 times hotter than the background electrons. They have a significant impact on the energy balance in the Jovian inner magnetosphere. However, their generation process has not yet been clarified. One difficulty is that the available data all comes from in-situ observations which cannot explore the temporal and spatial distributions explicitly. Therefore remote sensing which can take a direct picture of the plasma dynamics is necessary. In order to clear up the hot electron problem, the Earth-orbiting EUV spectroscope, EXCEED will be launched in 2013. It is dedicated and optimized for observing the terrestrial planets. Because of its large effective area and the simplicity of the scientific target, the better temporal resolution and more complete coverage on the Io plasma torus observation is expected. In this presentation, the optical design and specification of the EXCEED are introduced. Furthermore, based on the feasibility study using the spectral diagnosis method, it is shown that the EXCEED can determine the plasma parameters in the Io torus such as electron density, temperature, hot electron fraction and so on. The possibility of clearing up the hot electron problem through the EXCEED observation is also discussed.