Development of ultraviolet spectroscope for transit observation of exoplanetary exosphere

（系外惑星大気のトランジット観測に向けた紫外分光装置の開発）

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ABSTRACT

The Russian space telescope, World Space Observatory - Ultraviolet (WSO-UV), will be launched in 2023. WSO-UV has a primary mirror with 1.7 m diameter and several spectroscopic instruments. We are now proposing to install a spectrometer, Ultraviolet Spectrograph for Exoplanets (UVSPEX), to WSO-UV in a partnership with Space Research Institute of the Russian Academy of Sciences (IKI). The key science target of UVSPEX is detecting oxygen exospheres of exoplanets by transit

observations of Earth-type exoplanets. If the Earth is located in a habitable zone of a M-dwarf star, we expect that it has extremely expanded atmosphere of oxygen due to the short distance from the star and thus strong UV flux. In such case we can detect the oxygen atmosphere of an Earth-type exoplanet by UV transit observation. UVSPEX consists of a input slit, a troidal grating (2400 lines/mm), and a microchannel plate (MCP) detector. The target spectral range is 120-135 nm including OI (130.5 nm) and H Ly-alpha (121.6 nm). As a baseline design, all components are qualified in several space missions (e.g., Hisaki/EXCEED, BepiColombo/PHEBUS, and CLISP). In parallel we have started new to develop a new type of MCP detector to increase the detection efficiency of the instrument. Here we show the key sciences, the preliminary desin, the feasibility of UVSPEX, and current status of our developments.