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# Development of the UVSPEX for the WSO-UV to detect exoplanetary exospheric hydrogen and oxygen

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Many Earth-sized planets have been discovered and some appear to lie in the habitable zone. Moreover, several Earth-sized planets were recently detected around low temperature stars near the solar system. However, it is difficult to characterize them as Earth-like or Venus-like because we have no information on their atmospheres. The habitable zone of a low-temperature star is close to the star because of the star's low luminosity. Stellar extreme ultraviolet (EUV) radiation plays an important role in the ionization, dissociation, and heating of planetary upper atmospheres. EUV irradiation is estimated to be > 10 times higher around the habitable zone in these planets than that of Earth, which causes significant exospheric expansion. We simulated the oxygen column density on an Earth twin, Venus twin, and Mars twin in the habitable zone of a low-temperature star using results from Kulikov et al. (2007) and Tian et al. (2008). We found that when an Earth twin in the habitable zone of a low-temperature star transits its host star, the transit depth of the OI emission line at 130 nm becomes much deeper than that of a Venus or Mars twin. Because low temperature stars in a vacuum are dark in the UV range, including the O I emission line, a large space telescope and spectrograph with high efficiency are required to characterize these planetary atmospheres. We are developing the UV spectrograph for exoplanets (UVSPEX) for the World Space Observatory Ultraviolet (WSO-UV), Russian 1.7-m UV space telescope. The UVSPEX is composed of a toroidal grating and an MCP detector, which enables photon counting and is better for dark objects than a CCD detector. In this presentation, we introduce the current status of our project.