

Detailed characterization of exoplanet atmospheres by direct imaging spectroscopy

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Recent technological advances in the adaptive optics and the spectroscopy in astronomy opened a new window to study atmospheres of extra-solar planets in details. Until recently, precise characterization of exoplanet atmosphere was very difficult due to severely contaminated stellar light, which is usually 1000 times brighter than a planet light. The progress of adaptive optics, a real-time correction system of atmospheric turbulence, will enable us to significantly reduce the stellar contamination to the planet spectrum. Furthermore, high spectral resolution instruments, such as a newly commissioned near-infrared spectrometer at the Subaru telescope, Infrared Doppler (IRD) will allow us, not only to directly detect various molecules like methan, water, TiO, etc. in planet atmospheres, but also to study planet kinematics, i.e. rotation, radial velocity, etc., a key to understand an origin and formation mechanism of Jupiter-like planets. We will present the current status of our project by combining the adaptive optics and high-spectral resolution spectrometer. This project will lead to ultimately detect and characterize Earth-like planet and biomarkers in their atmospheres.

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