

## **Space-based direct imaging of exoplanetary environment**

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The study of extrasolar planets is one of the most exciting research endeavors of modern astrophysics. Most of the exoplanets have been discovered through ground-based radial velocity and space-based transit techniques. While the list of known planets continues to grow, no direct image of any solar-system analog exoplanet around a sun-like star has been obtained to date.

Our research group has developed various optical imaging techniques for challenging ground- and space-based applications from lidars for forestry applications to spectral imaging for upper atmospheres and astrophysical applications. The Planet Imaging Concept Testbed Using a Rocket Experiment (PICTURE) has been launched aboard a NASA sounding rocket twice and matured key enabling technologies necessary to obtain physical parameters of exoplanets through direct imaging. Next year, we will fly the most recent version of the sounding rocket instrument, called Planetary Imaging Concept Testbed Using a Recoverable Experiment-Coronagraph (PICTURE-C), aboard a high-altitude balloon to observe multiple targets.

In this talk, I will describe the experiment and the present status PICTURE-C program. I will also describe some of our other projects that could begin a discussion on future joint research collaboration. In all our research projects, we involve graduate and undergraduate students in meaningful roles.