
MODHIS: the first-light single-mode fiber fed high resolution exoplanet characterization spectrograph for the TMT, project overview and status

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Abstract

MODHIS is a first light instrument that will enable high resolution spectroscopy from y-K band on the TMT. It is a single-mode fiber fed spectrograph that relies on the adaptive optics correction provided by NFIRAOS. By operating at the diffraction-limit the MODHIS spectrographs, split into two near identical units with a yJ and HK channel, are extremely compact and can be in the wedge room at the bottom of the building. Injecting light from a 30-m aperture into a single-mode fiber with a core size of the order of 5 microns requires a high-performance adaptive optics correction, schemes to eliminate non-common path errors, a high-quality correction to the differential atmospheric refraction, and precise pointing and tip/tilt control. These issues are currently under investigation with the pathfinder injection unit commissioned at Keck known as the Keck Planet Imager and Characterizer. MODHIS also leverages significant developments from a near identical precursor instrument aimed to be deployed to Keck in 2026: HISPEC.

In this paper we will review the status of MODHIS, outline the science case for the instrument and the adaptive optics observing modes it supports. We will review the spectrometer backend capabilities and design heritage with HISPEC and other ongoing developments.

Keywords: fibers, spectrometers

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