



Contribution ID: 38

Type: **not specified**

Optical design of thermal infrared imager for the SCALES on Keck

A third-generation Adaptive optics instrument named SCALES, Slicer Combined with Array of Lenslets for Exoplanet Spectroscopy, is being planned for commissioning on the W. M. Keck Observatory in near future. It has an integral field spectrograph (IFS) and a diffraction-limited infrared imaging channel to discover and spectrally characterize the directly imaged exoplanets. The imaging channel is intended to cover a rectangular field of $12'' \times 12''$ and has minimal distortions, low wave-front error, and is highly telecentric as necessary for astrometry and high contrast imaging. It will operate in the wavelength band starting from near-infrared to mid-infrared ($1-5 \mu\text{m}$). In terms of capacity, it will be an improvement and substitute for the NIRC2. Additionally, the imaging channel images the pupil to aid the alignment process for pupil and cold stop. Further, the imaging camera would also assist in small field acquisition for IFS. Here we present the optical design, analysis and performances.

Presentation type

Oral

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