# Keck Planet Imager and Characterizer: status updates

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**Abstract**

The Keck Planet Imager and Characterizer (KPIC), deployed at Keck observatory since the end of 2018, connects the Keck-II adaptive optics system and the high-resolution spectrograph NIRSPEC through single-mode optical fibers to provide high-contrast, high resolution (R ∼ 35000) K-band spectra of directly imaged exoplanets. Initially built as a pathfinder for future instruments such as HISPEC and MODHIS, KPIC successfully demonstrated its ability to detect and measure critical physical properties of directly imaged exoplanets. After a few years of exploitation and more than twenty substellar companions observed, KPIC was upgraded at the beginning of 2022 to improve its overall performance, simplify its operation, and test new modules and techniques. In addition to being 60% more sensitive, the second version of KPIC is easier to calibrate and operate during the night. It will also see its standard observing mode facilitized by the end of 2023. The other modules deployed during the KPIC upgrade such as the vortex fiber nuller (VFN), the Zernike wavefront sensor (ZWFS), the high order deformable mirror (HODM) and the Phase Induced Amplitude Apodization (PIAA) will be progressively tested and used to improve KPIC performances. We will present the current version of KPIC, discuss its performance and the mode expected to be offered to the community. We will also describe some of the ongoing developments and plans for the coming years.

**Keywords:** Instrumentation, W. M. Keck Observatory, Exoplanets, High contrast imaging, High dispersion coronagraphy, High resolution spectroscopy

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