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The NIRSPEC Upgrade for the Keck II Telescope

NIRSPEC is a high-resolution ($R \sim 25,000$), cross-dispersed, echelle spectrograph operating from 1-5 μm on the Keck II telescope. In Fall 2018, we upgraded the instrument to increase its sensitivity and ensure its continued longevity. We have also used the NIRSPEC instrument as a testbed for developing new technologies, such as laser frequency combs, to improve instrumental stability for upcoming extreme precision radial velocity (PRV) instruments. We present details on the major components of the upgrade, including 1) new spectrometer detector, 2) new slit viewing camera, 3) new motion control electronics, and 4) improved instrumental stability. We will show initial on-sky results from our December 2018 commissioning and discuss the impact the upgrade will have for observers. The improvements we are making will increase sensitivity in the photon-limited regime by ~ 1 mag, allowing for observations of fainter targets and more efficient observing. We also expect the stability improvements to improve our sensitivity below ~ 100 m/s. We will discuss these improvements in the context of upcoming PRV instruments, with lessons-learned.

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