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NEID and HPF: Optical designs of two large, extreme precision Doppler spectrographs

NEID and HPF both were conceived to deliver ground-breaking precision in their wavelength regime. HPF has now been commissioned at the Hobby Eberly Telescope, while NEID is fully integrated and set to be deployed at WIYN in Summer 2019. The instruments both use 2x1 mosaic of the same RGL master grating at R4, with nearly 200mm beam diameter, in a white pupil configuration. The cross dispersion and camera systems are rather different, using distinctive methods to flatten the field and to deliver a design image quality that approaches the diffraction limit across most of the spectral range. We present the instrument optics and discuss some lessons learned in building these instruments. We also present the optical design of NEID telescope port with a high performance ADC and very tight optical specifications on fiber coupling.

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