

## The Science with four 1.8-m Telescopes at the Navy Prototype Optical Interferometer

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The Naval Observatory (USNO), the Naval Research Laboratory (NRL), and Lowell Observatory together produce optical, interferometric astrometry and imaging using the siderostat-based Navy Prototype Optical Interferometer (NPOI) Array at Anderson Mesa near Flagstaff, Arizona. A lengthy optical train has until recently forced a limiting magnitude of  $V \approx 6.5$ , which is now being addressed with the incorporation of four new filled-sparse apertures: the 1.8-m Telescopes once destined for use as outriggers to the Keck 10-m telescopes. Using the new  $4 \times 1.8$ -m interferometric array with optimized baselines between 48 and 179 meters, we project a healthy improvement to our limiting magnitude down to a  $V$  of 9.5 or better (with our inclusion of adaptive optics), and we add a near-infrared capability which we determine will be to a magnitude limit of  $K \approx 8$ . This layout and increased sparse aperture will permit significant improvements to the science capability, from a ten-fold increase in wide-angle,  $\leq 10$  milliarc-second star-field access for astrometric catalogs and reference tie frame objects, to the ability to resolve Sun-like stars to 3% at 12 pc. The new NPOI capability will additionally lend itself to refining photospheric models by stellar type, which would produce more precise radii for exoplanet host stars. The larger telescopes will improve our study of the oblateness for rapidly rotating stars, and our ability to resolve and study stellar Be disks. Our new infrared capability will allow disk and dust studies with improved fidelity, and will ultimately lead to our improved understanding of planetary formation and evolution.

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