

Update on VISION at NPOI

And Completely Unrelated Collaboration Opportunities

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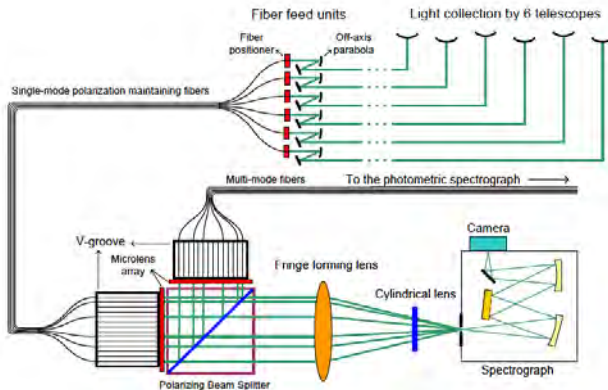


VISION: Visible Imaging System for Interferometric Observations at NPOI

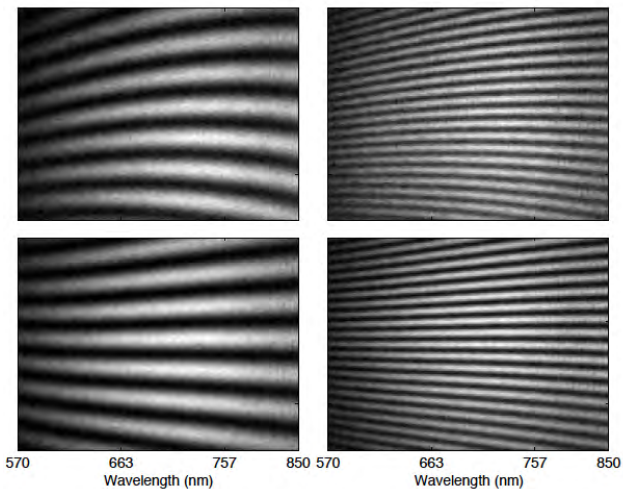
- ▶ Construction: NSF MRI – R²
(American Reinvestment and Recovery Act) Funded
- ▶ Improve NPOI Data Product Precisions by 10×
- ▶ Improved System Visibilities: Low Visibility Targets
- ▶ Avoid Systematic Effects:
Delay Nonlinearities, APD Afterpulsing
- ▶ Monitor all baselines
- ▶ Spectral Resolution Flexibility
- ▶ Modernize Equipment

VISION Design

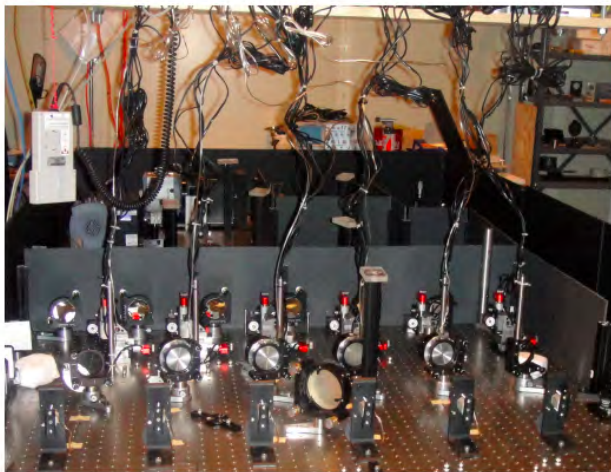
MIRC, With Modifications



Lab Fringes



VISION Design



Science Programs

- ▶ Imaging Stellar Surfaces
- ▶ Emission Line Studies: High Spectral Resolution
- ▶ Baseline Bootstrapping: Beyond the first visibility zero
- ▶ Defending Democracy, Deterring Aggression, and Maintaining Freedom of the Seas (Imaging Satellites)
- ▶ Triple Star Systems



Complementarity and Divergence With MIRC

- ▶ Combined IR-Visible Studies
- ▶ VISION: Photon Counting, Baseline Bootstrapping, baseline flexibility
- ▶ MIRC: Sensitivity Advantage—IR/Telescope Size (until 1.8m....)
- ▶ High-Contrast Objects
 - ▶ Separated Objects: Want Lower Contrast
 - ▶ Faint is redder than Bright: IR (BD's, Planets)
 - ▶ Faint is bluer than Bright: Visible (CVs, Thanks Fabien)
 - ▶ Embedded Objects: Want Higher Contrast (Star Spots, Visible)

Fairborn Observatory: Fully Robotic Photometry and Spectroscopy



Robotic Photometry

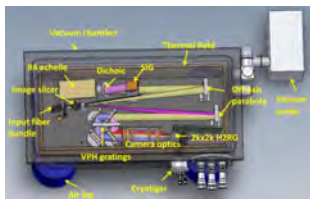
Automatic Photometric Telescopes (APTs)

- ▶ Operations:
 - ▶ 6 Telescopes (0.4, 0.75, 4 × 0.8 m)
 - ▶ Single Pixel (PMT), 2-channel (b-y), photometers
 - ▶ Sequential observations of calibration/check stars
- ▶ Benefits:
 - ▶ Nearly Maintenance Free (this year, OS updates during monsoon season, and a few mouse-chewed cables replaced).
 - ▶ Precision: 1 milli-mag/obs; 0.1 milli-mag seasonal repeatability
 - ▶ Long-term stability: 0.4m APT in operation since 1987
 - ▶ Cost-efficient: Under \$30k/year/telescope
- ▶ Tradeoff
 - ▶ *Not* versatile
- ▶ Also: Red-sensitive 14" Imaging (CCD) Telescope

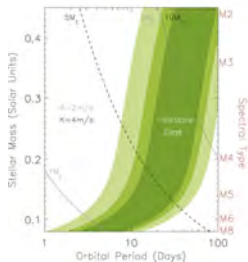
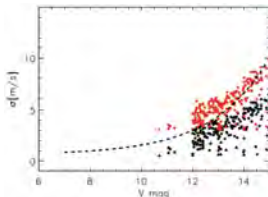
AST Complex, September 2012



Future: FIRST



- ▶ $R = 68,000$ ($1.4\text{--}1.8 \mu\text{m}$), $R = 56,000$ ($0.8\text{--}1.35 \mu\text{m}$),
- ▶ **M Dwarf Planet Survey**
- ▶ **Young Star Planet Survey**
- ▶ SB1 \rightarrow SB2
- ▶ Cold Stellar Atmospheres
- ▶ Young Stars



Contact Information

Observations by TSU's Fairborn Telescopes are generally available on a collaborative basis.

- ▶ For photometric measurements with the Fairborn APT's and new Imaging Telescope, contact:
Greg Henry, gregory.w.henry@gmail.com
- ▶ For spectroscopic measurements from the Fairborn AST, contact:
Matthew Muterspaugh, matthew1@coe.tsuniv.edu
- ▶ For technical questions, please contact:
Michael H. Williamson, michael.h.williamson@gmail.com