



## The RIT-Yale Tip-tilt Speckle Imager (RYTSI)

Reed D. Meyer<sup>1,2</sup>, Elliott P. Horch<sup>1</sup>, Zoran Ninkov<sup>1</sup>, and William F. van Altena<sup>2</sup>

<sup>1</sup>Center for Imaging Science, RIT

<sup>2</sup>Department of Astronomy, Yale University

# The Purposes of RYTSI

## Primary Scientific Goal

Measure binary star differential magnitudes via speckle interferometry

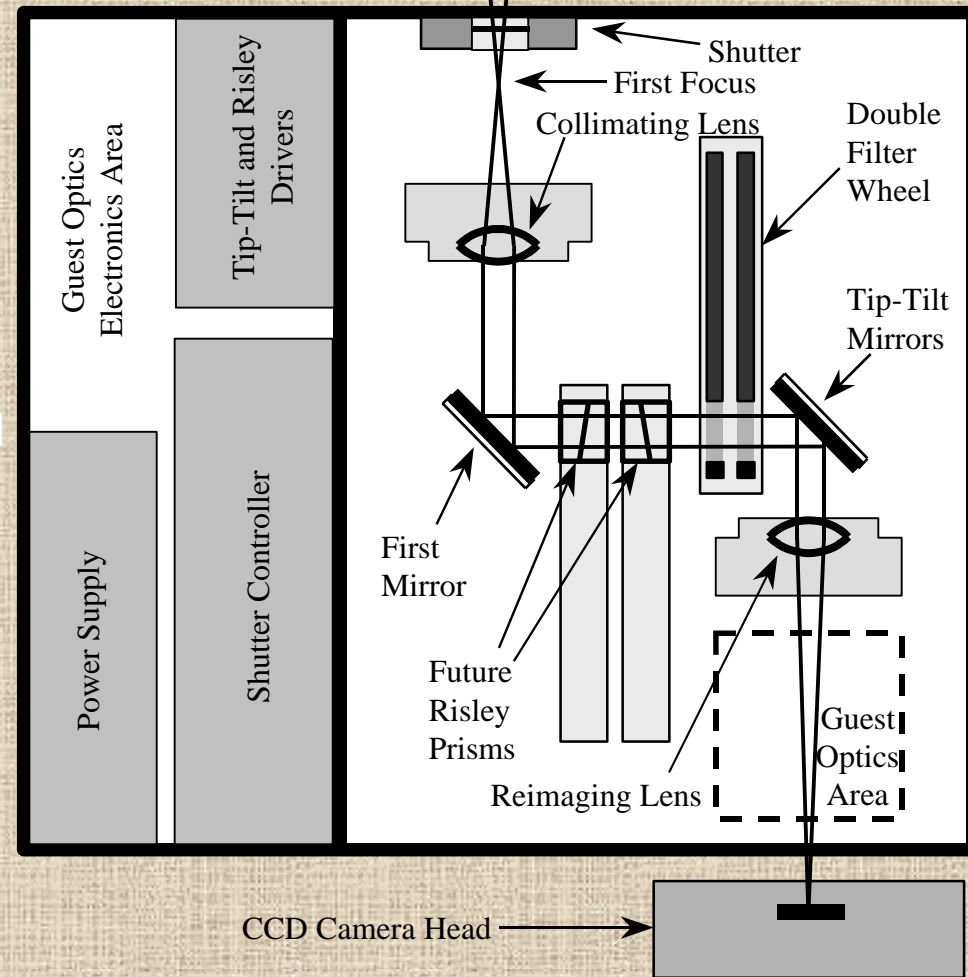
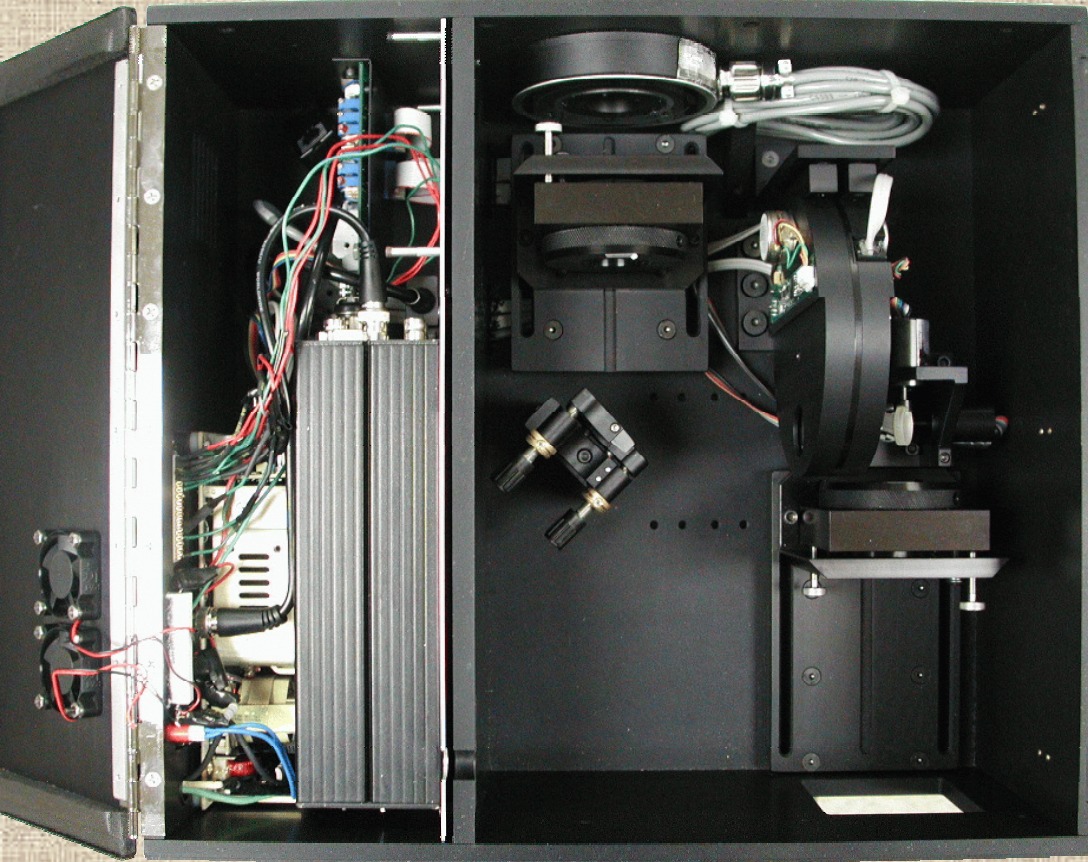
- RYTSI: first instrument designed for this purpose
- Unlike most speckle interferometry detectors, CCDs are linear

## Instrumentation Goal

Turn an off-the-shelf, moderate-speed CCD into a detector suitable for stellar speckle interferometry

- Prior to RYTSI, CCDs were used, but required specialized readout methods or very fast readout speeds
- Allows focus on QE and read noise rather than speed and electronics

# The Interior of RYTSI



# The WIYN Observatory

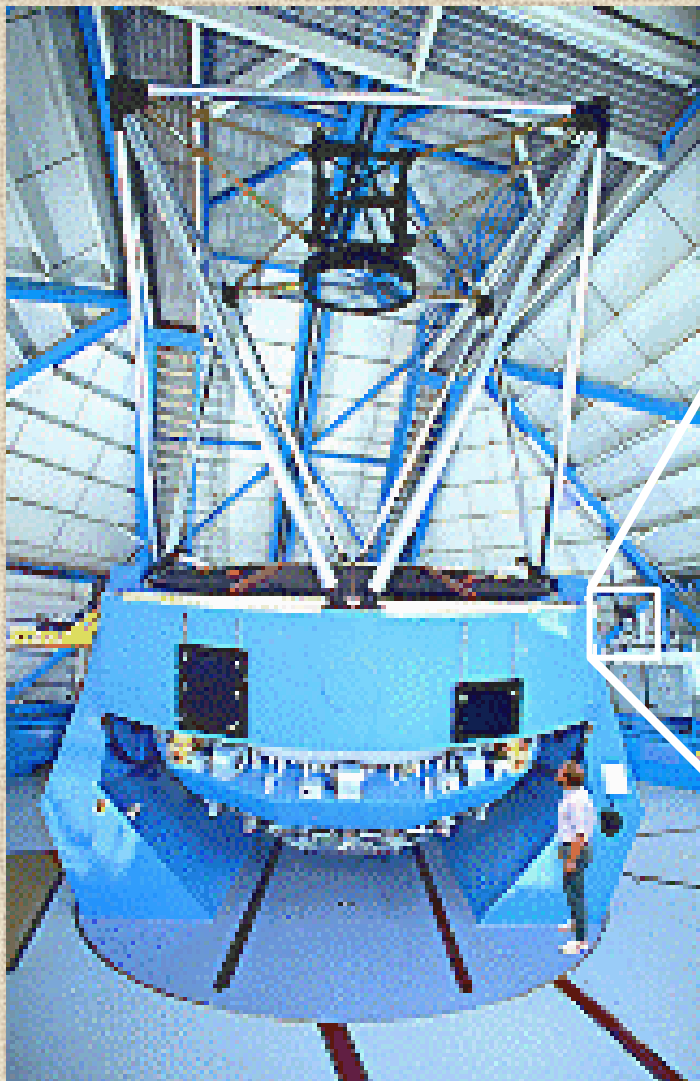


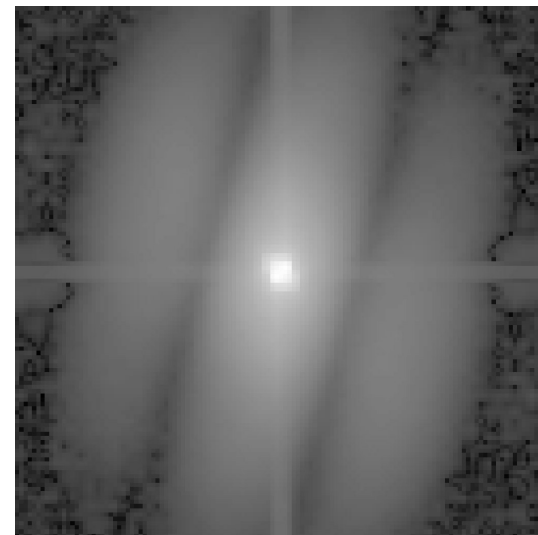
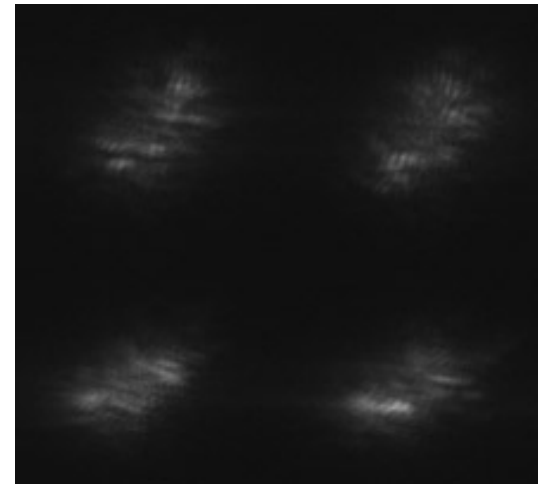
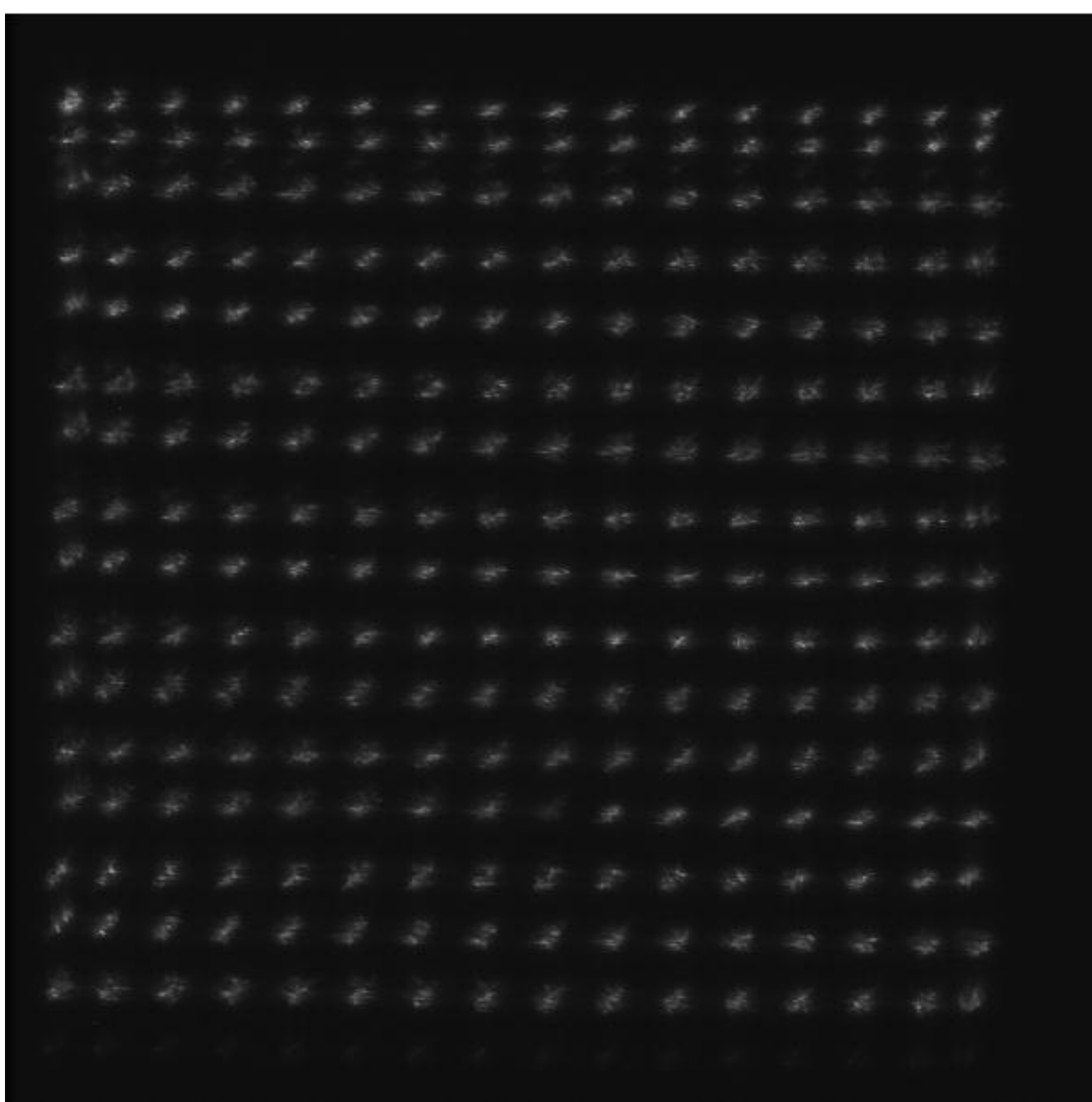
**The WIYN Telescope**



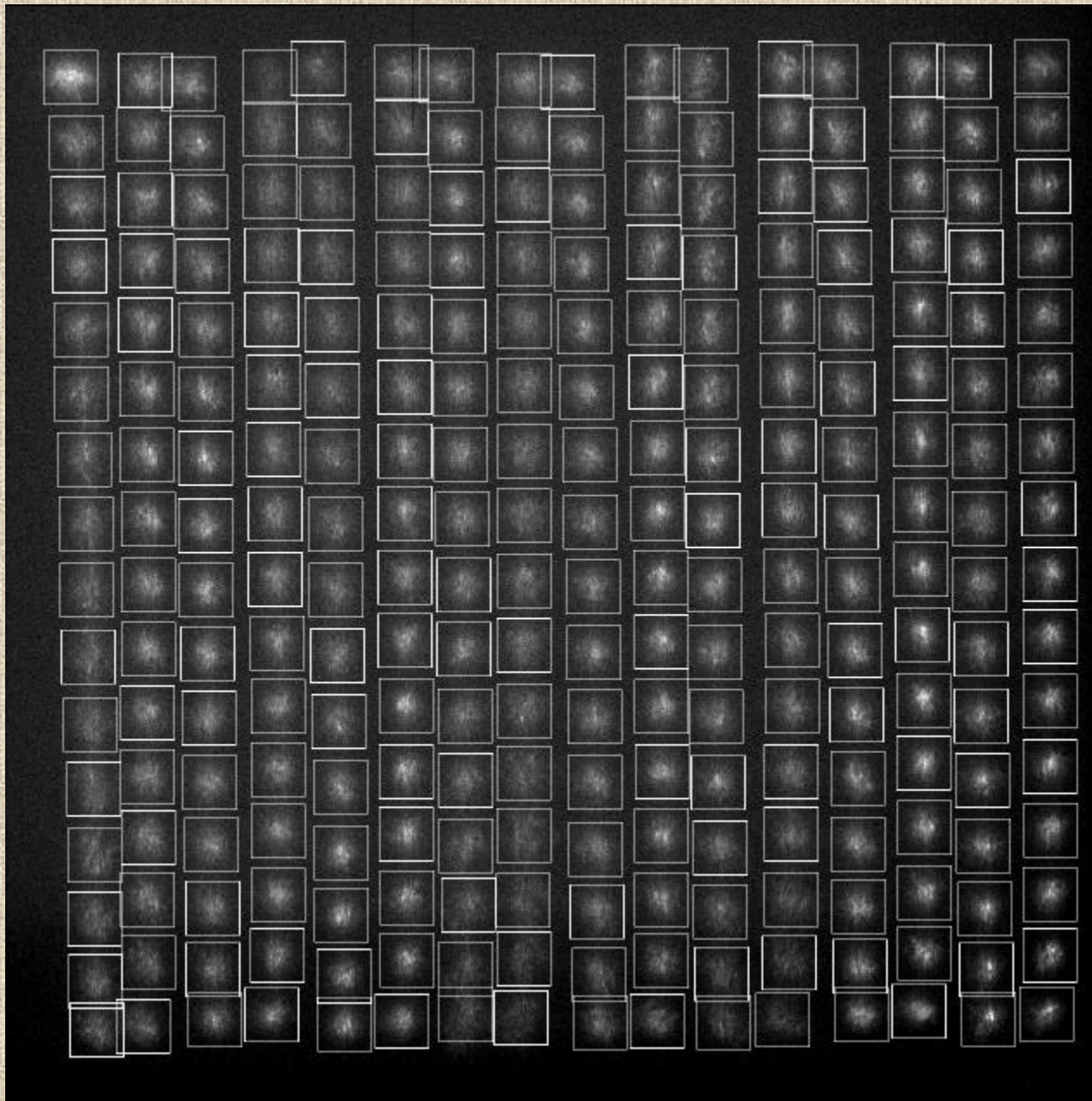
**Kitt Peak, Arizona**

# RYTSI Mounted at WIYN





# Image Position Issues



(C. Rothkopf, RIT)

# Binary Star Photometry

- Important to measure stellar parameters (masses, luminosities, temperatures, etc.) *jointly*  
e.g., H-R diagram (luminosity vs. temperature)
- Mass is most important stellar parameter, but can only measure masses (directly) for binary star components
- Therefore, must measure luminosities and temperatures of binary stars, to compare with masses
- Perform binary star photometry and compute luminosities and temperatures through, e.g., spectral fitting

