Introduction

Speckle imaging allows telescopes to achieve diffraction limited imaging performance. The technique requires cameras capable of reading out frames at a very fast rate, effectively ‘freezing out’ atmospheric seeing. The resulting speckles can be correlated and images reconstructed that are at the diffraction limit of the telescope. These new instruments are based on the successful performance and design of the Differential Speckle Survey Instrument (DSSI) [2, 1].

The instruments are being built for the Gemini-N and WIYN telescopes and will be made available to the community via the peer review proposal process. We envision their primary use to be validation and characterization of exoplanet targets from the NASA K2 and TESS missions and RV discovered exoplanets. Such targets will provide excellent follow-up candidates for both the WIYN and Gemini telescopes [3]. Examples of DSSI data are shown in the figures below. We expect similar data quality in speckle imaging mode with the new instruments.

Additionally, both cameras will have a wide-field mode and standard SDSS filters. They will be highly versatile instruments and it is likely many other science programs will request time on the cameras. The limiting magnitude for speckle observations, will remain around 13-14th at WIYN and 16-17th at Gemini, while wide-field, normal CCD imaging operation and it is that likely many other science programs will request time on the cameras. The instruments will also have high utility as scoring cameras for telescope engineering purposes, or other applications where high time resolution is needed. Instrument support will be provided, including a software pipeline that takes raw speckle data to fully reconstructed images.

Gemini North

Telescope f/# 16.0
Plate scale 1.592 ̋/mm

GemSpeck - Speckle mode
Focal Lengths
L1 35 mm
L2 75 mm

Detector Image Plane
Magnification 2.14x
Pixel Scale 0.0006 ̋/pxl
Unvignetted Circle Dia 6.7 ̋
Detector FoV 9 x 9 ̋

GemSpeck - Wide-Field mode
Focal Lengths
L1 75 mm
L2 100 mm
L3 50 mm

Detector Image Plane
Magnification 0.286x
Pixel Scale 0.0075 ̋/pxl
Unvignetted Circle Dia 60 ̋
Detector FoV 74 x 74 ̋

GemSpeck - top view, mounted at the GCa1 port

Acknowledgments

We acknowledge the collaborations with the WIYN and Gemini observatory staff and the support for this project from the NASA Exoplanet Exploration Program and NASA Headquarters.

Notes


References

"https://ntrs.nasa.gov/search.jsp?R=20160007916 2019-09-07T08:27:05+00:00Z