
The wide-field phasing testbed for the Giant Magellan Telescope

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Abstract

Phasing the seven segment pairs of the doubly segmented Giant Magellan Telescope over an extended field of view requires measuring wavefront piston at multiple field locations. This will be done using a dispersed fringe sensor in each of four identical units of the GMT Acquisition, Guiding, and Wavefront-sensing System (AGWS). To test the methods planned for the GMT, we have constructed a laboratory Wide-field Phasing Testbed (WFPT), as well as a full-sized prototype of a single AGWS unit. The primary mirror of the GMT is represented by a seven-element piston-tip-tilt flat mirror array paired with an ALPAO DM292 deformable mirror. A second segmented mirror array and DM292 are used to represent the GMT's secondary mirror. These four elements are fed by a set of off-axis parabolas at the correct conjugate positions, allowing us to generate the expected off-axis misalignment aberrations over the telescope's 10 arcminute field of view. The testbed also includes elements to simulate atmospheric turbulence and chromatic dispersion. We present an overview of the designs and early results from the WFPT + AGWS experiments.

Keywords: wavefront sensing, active optics, phasing, testbeds

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