Gemini North Adaptive Optics System Performance Simulations

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Abstract

The Gemini North Adaptive Optics (GNAO) system is the planned upgrade the Gemini North telescope's AO system. GNAO will have a single ground-conjugated deformable mirror (DM) and use an asterism of 4 sodium Laser Guide Stars (LGSs) which can be configured in both narrow and wide field modes. As part of one of the Adaptive Optics Bench (AOB) Phase A design study teams, The Object Oriented Matlab Adaptive Optics (OOMAO) simulation tool has been used to model the performance of the GNAO system in both modes. A large parameter space has been explored, including the effects of wavefront sensor (WFS) and DM order, LGS asterism radius, tip/tilt (T/T) star number and location, and performance as a function of telescope zenith angle. A variety of error terms, including noise, NCPA, and secondary mirror print through have been incorporated. This work has been used to produce the expected error budget of the proposed AOB design.

Keywords: Laser Tomography, Gemini North AO, Wavefront reconstruction

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