
AOB-1: Phase A study for the Gemini North AO instrument, inovative concepts and expected perfomance.

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Abstract

AOB-1 is a LAM/ONERA/ASTRALIS Adaptive Optics (AO) facility currently designed to feed the GIRMOS instrument on the GEMINI North 8m class telescope located in Hawaii. This AO system can operate in two modes. A laser tomography AO (LTAO) mode using 4 LGS (laser guide stars) and (1-3) NGS (natural guide stars) for high performance over a narrow field of view (a few arcsec). The LTAO reconstruction will benefit from the most recent developments in the field, such as the super-resolution concept for the multi-LGS tomographic system, the calibration and optimization of the system on the sky, etc. The system will also operate in Ground Layer Adaptive Optics (GLAO) mode providing a robust solution for homogeneous partial AO correction over a wide 2' FOV. This last mode will also be used as a first step of a MOAO (Multi-object adaptive optics) mode integrated in the GIRMOS instrument. Both GLAO and LTAO modes are optimized to provide the best possible sky coverage, up to 60% at the North Galactic Pole. Finally, the project has been designed from day one as a fast-track, cost effective project, aiming to provide a first scientific light on the telescope by 2027 at the latest, with a good balance of innovative and creative concepts combined with standard and well controlled components and solutions. In this paper, we will present the innovative Phase A concepts, design and performance analysis of the two AO modes (LTAO and GLAO) of the AOB-1 project.

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