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# The new Laser Launch Telescopes for Gemini North AO: design, characterization and serial production

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## Abstract

The new Gemini North AO (GNAO) laser guide star facility (LGSF) needs four Laser Launch Telescopes (LLTs) to enable both wide and narrow field corrections using GLAO and LTAO. Early in 2021 Officina Stellare has been awarded a contract to design and build four LLTs. Based on a preliminary LLT design submitted during the call for tender phase, Officina Stellare performed a one-year design study, starting the manufacturing of an engineering and qualification model (EQM) to validate this design and minimize risks on the production of the four deliverable units. After manufacturing of mechanical and optical parts including the large aspherical lens, made in-house by CNC optical polishing and tested by high-resolution interferometry, the EQM underwent a full set of mechanical and optical tests to validate its performances under representative operating conditions, including gravity, pressure and temperature. The serial production of the other four units, to be installed on the telescope, has started, with all key components already done.

**Keywords:** LGS laser, launch telescope, beam steering, large aspherical lenses

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