The GTC Adaptive Optics and Laser Guide Star system (GTCAO-LGS)

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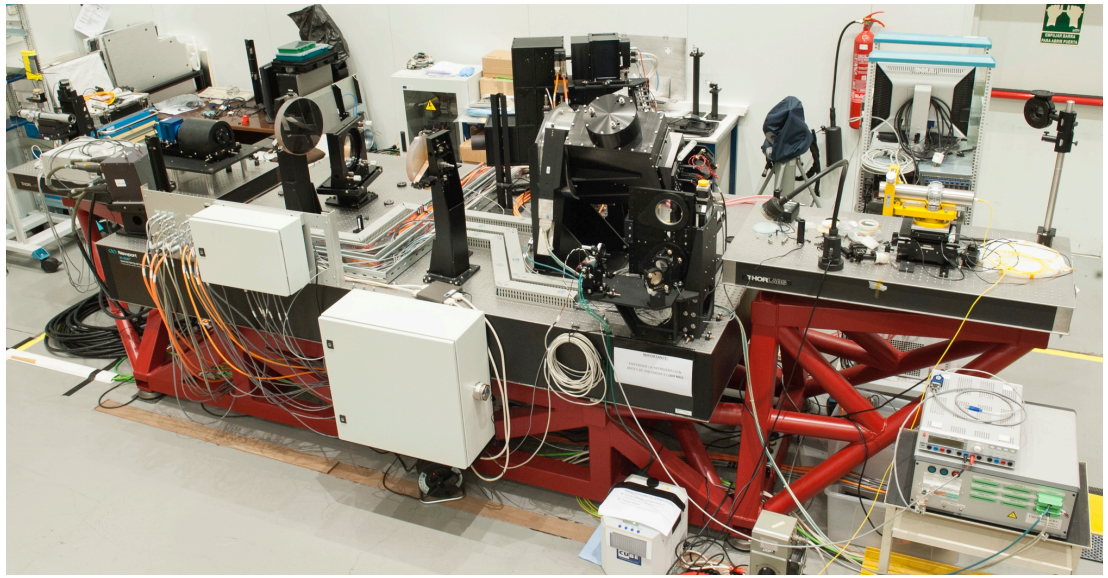
Abstract:

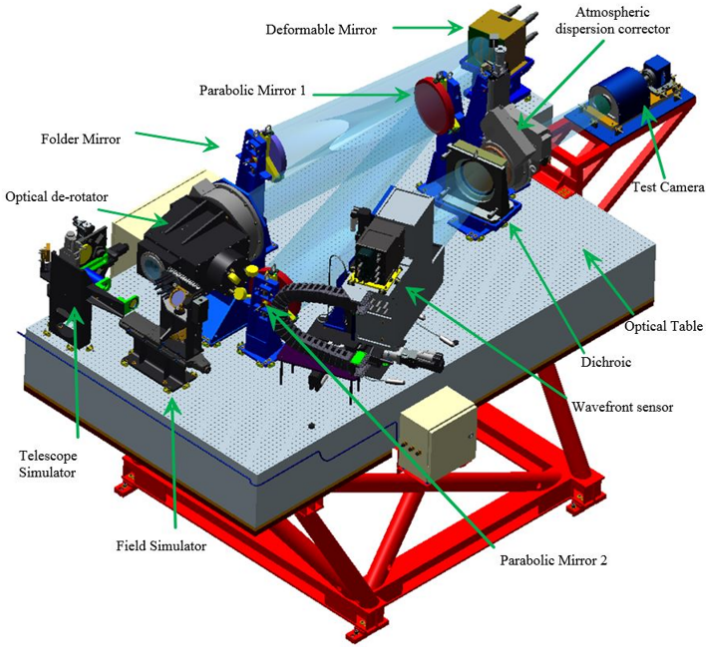
The GTC Adaptive Optics (GTCAO) system will provide diffraction-limited capabilities in the near infrared to the GTC telescope. At first, it will use a Natural Guide Star (NGS) as a reference source, and later it will be upgraded to a Sodium Laser Guide Star (LGS), which will significantly increase the sky coverage.
The GTCAO system is expected to provide a strehl ratio of 0.65 in the K-band with a bright NGS and a minimum strehl ratio of 0.1 with the LGS using a tip-tilt star brighter than 18 mag.
We will review the current status of the performance tests of the GTCAO system in the IAC laboratory, and present the development of the LGS system at the IAC, which is currently in the detailed design phase.

GTCAO update

- All the subsystems already tested at the lab
- Testing the GTCAO performances including Non-Common Path Aberrations (NCPAs)
- Design a mechanism in the Calibration System to focus the input fiber to TestCam and FRIDA
- Develop the SW of the TestCam, mechanisms in the GTC Control System
- Built of the final GTCAO structure



GTCAO at AIV lab

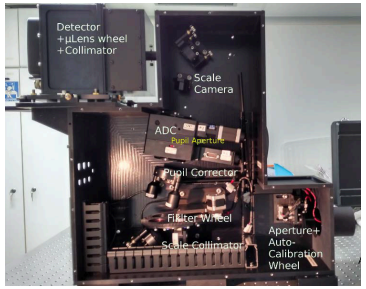


GTCAO 3-D design

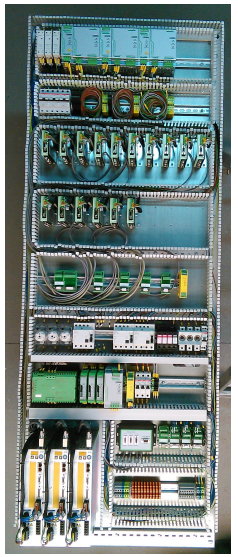
GTCAO-LGS at AIV lab

WFS camera

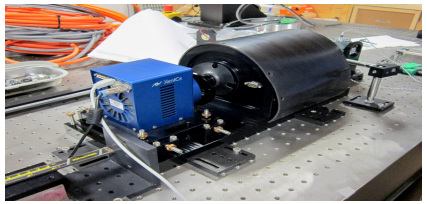
WFS



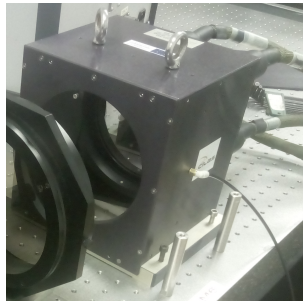
GTCAO cabinets



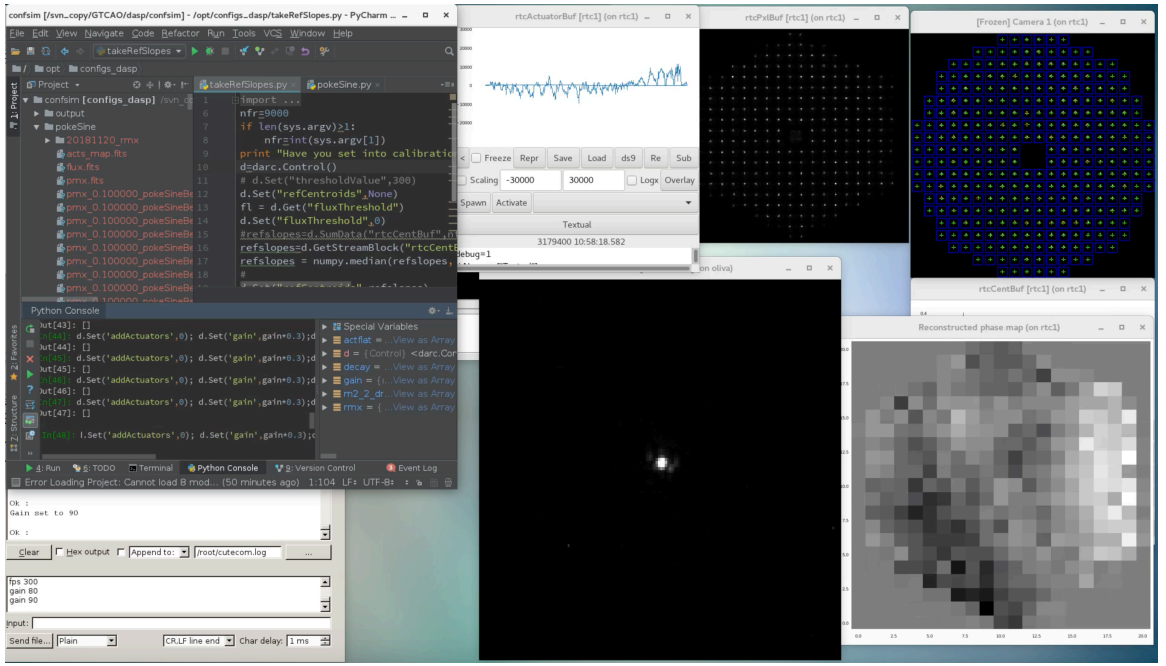
TestCam



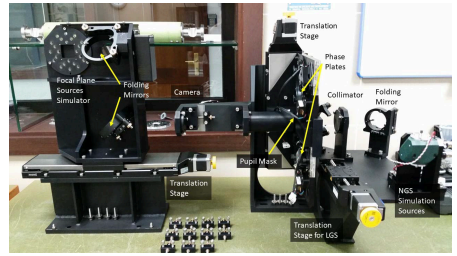
Deformable Mirror



GTC structure



GTC Software



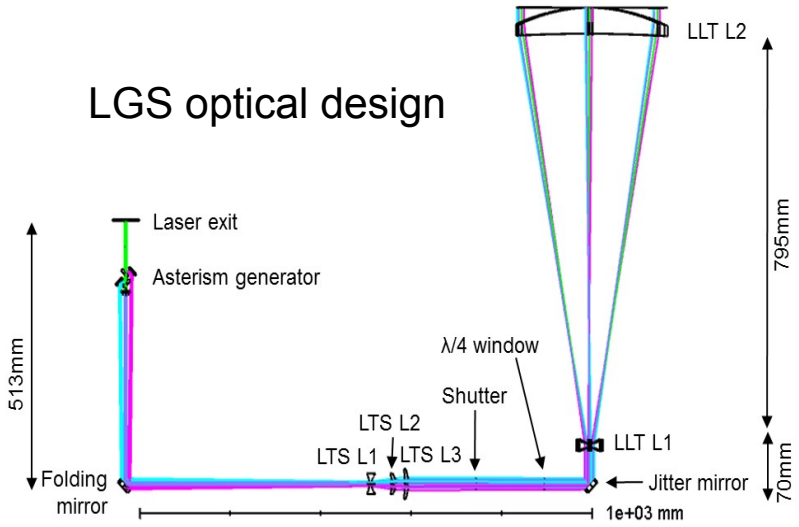
GTC Calibration System

WFS turnable arm

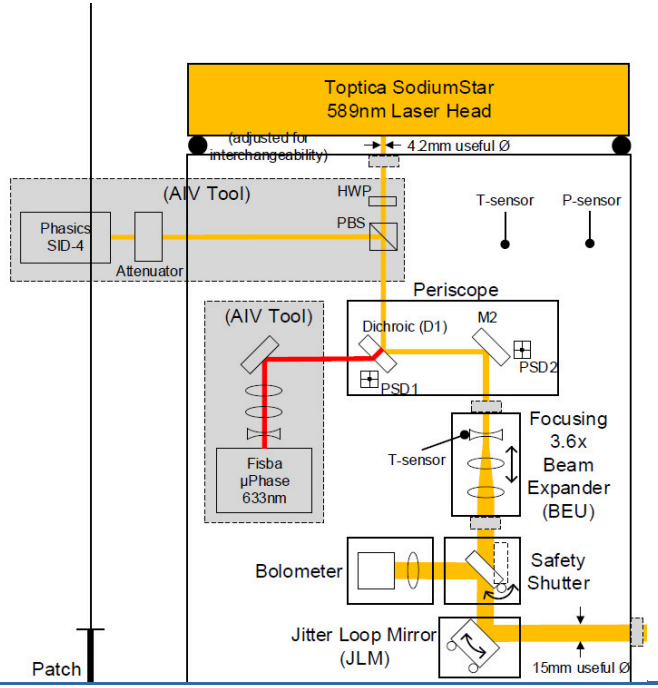
GTCAO-LGS update

- GTCAO-LGS passed the Preliminary Design Review (PDR, May 2019)
- TOPTICA Laser acceptance tests done at the IAC lab (December 19)
- Purchase of several components the Diagnostic System
- Launch Telescope tender realeased

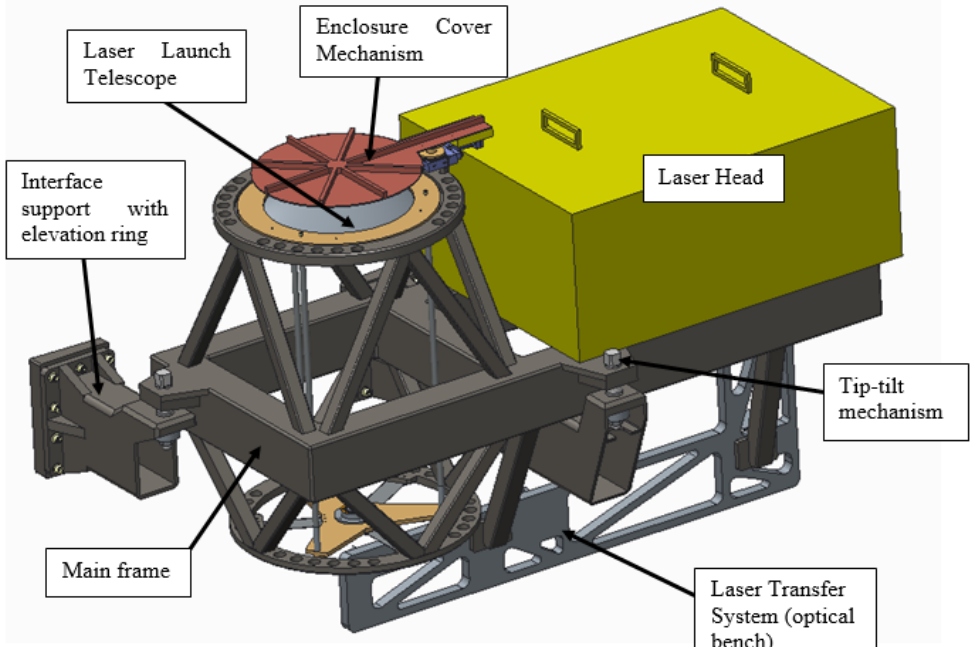
LGS optical design



LGS Diagnostic System

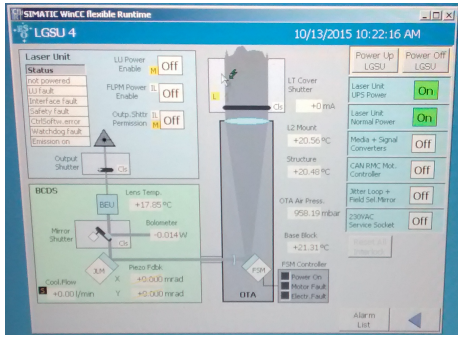


LGS mechanical structure design



TOPTICA Laser acceptance

- Fiber Laser Power Supply
- Fiber Laser Pump Module
- Wavelength Measurement Module
- Programmable Logic Controller Module
- Power Entry Module
- Main / Seed Laser Module
- Hydraulic Module



Toptica Laser SW

GTCAO and LGS schedule

MILESTONE	DATE
GTCAO AIV completed in lab – Acceptance tests	Spring 2021 (TBC with GRANTECAN)
GTCAO AIV in GTC	Summer 2021 (TBC with GRANTECAN)
Laser system final acceptance at IAC	July 2020
Detailed Design LGS	CDR Spring 2021
Laser Launch Telescope acceptance at IAC	September 2021
LGS Subsystems integration in laboratory	2022
LGS AIV in laboratory completed – ready for acceptance tests	End 2022
LGS AIV en GTC	Summer 2023

Acknowledgements: This activity is funded by the Canary Islands Local Government, within the program "Canarias objetivo de progreso" promoted by the European Regional Development Fund of the European Union, operative program 2014-2020. It is pre-financed through a loan from the Spanish Ministry of Economy (State Secretary for Research), the support from the State Research Agency (AEI) of the Spanish Ministry of Science, Innovation and Universities (MCIU) and the European Regional Development Fund (FEDER) under grants with references EQC2018-005097-P and EQC2019-006713-P.
We acknowledge the collaboration of the staff of the Gran Telescopio Canarias, for the help, support, advice and participation during the developments of the GTCAO LGS project. This collaboration has been possible based on the agreement signed by IAC and GRANTECAN for the completion of the development of the GTC Adaptive Optics System. We acknowledge also the collaboration of the European Southern Observatory (ESO). The team of the 4 Laser Guide Star Facility (4LGSF) of VLT has given support and advice along all the development of the GTCAO-LGS system. This collaboration has been possible based on the agreement signed by IAC and ESO for collaborative activity in Laser Guide Star technologies and field experiments.