



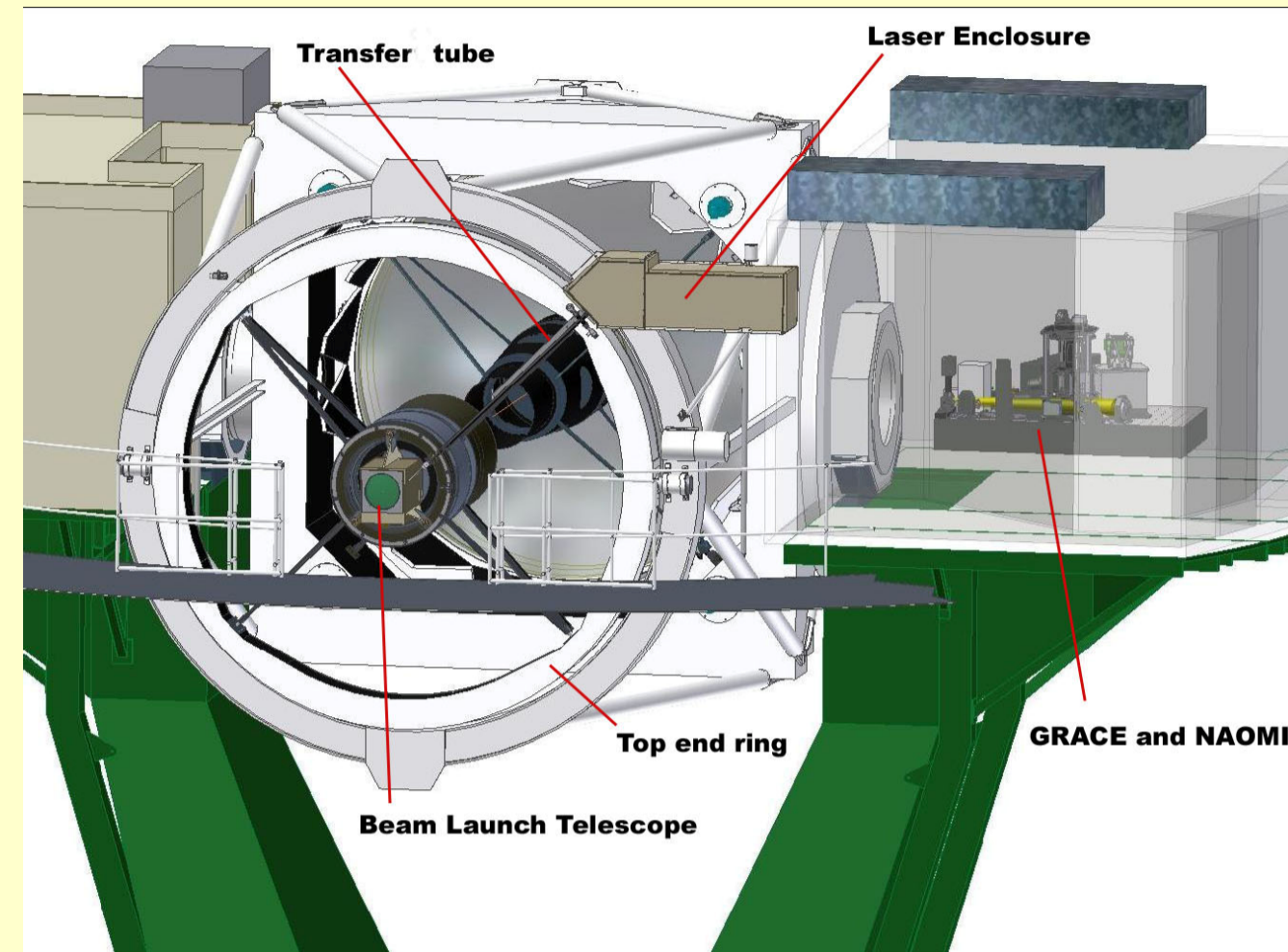
Optomechanical commissioning of the GLAS Rayleigh laser guide star for the WHT

Olivier Martin, Tibor Agócs, Diego Cano, Thomas Gregory, Michiel van der Hoeven, Paul Jolley, Carlos Martín, Tim Morris, Sergio Picó Renee Pit, Jürg Rey

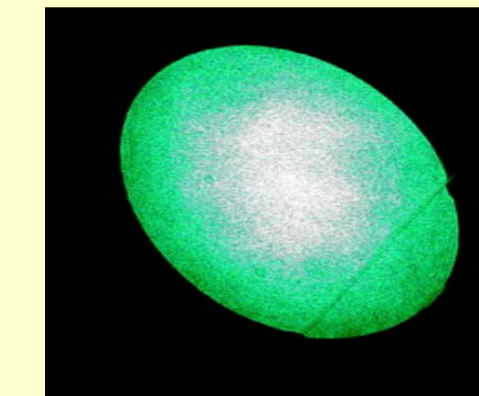
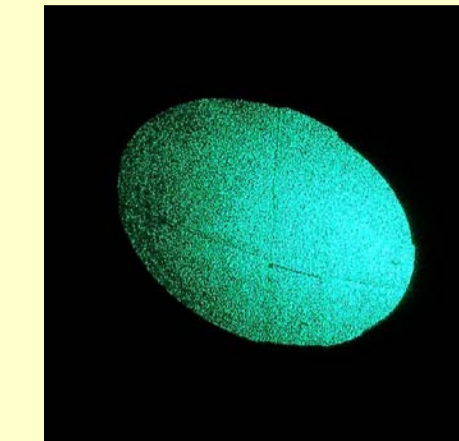
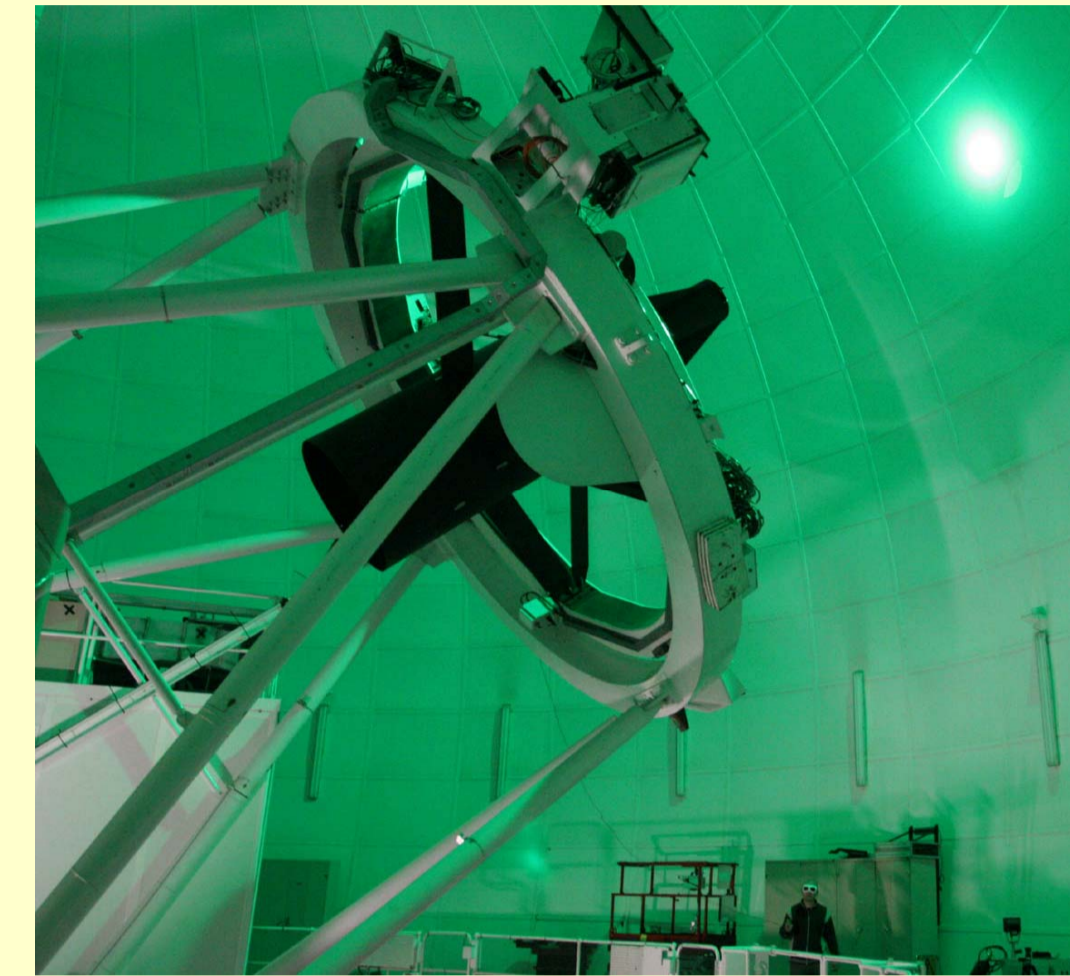
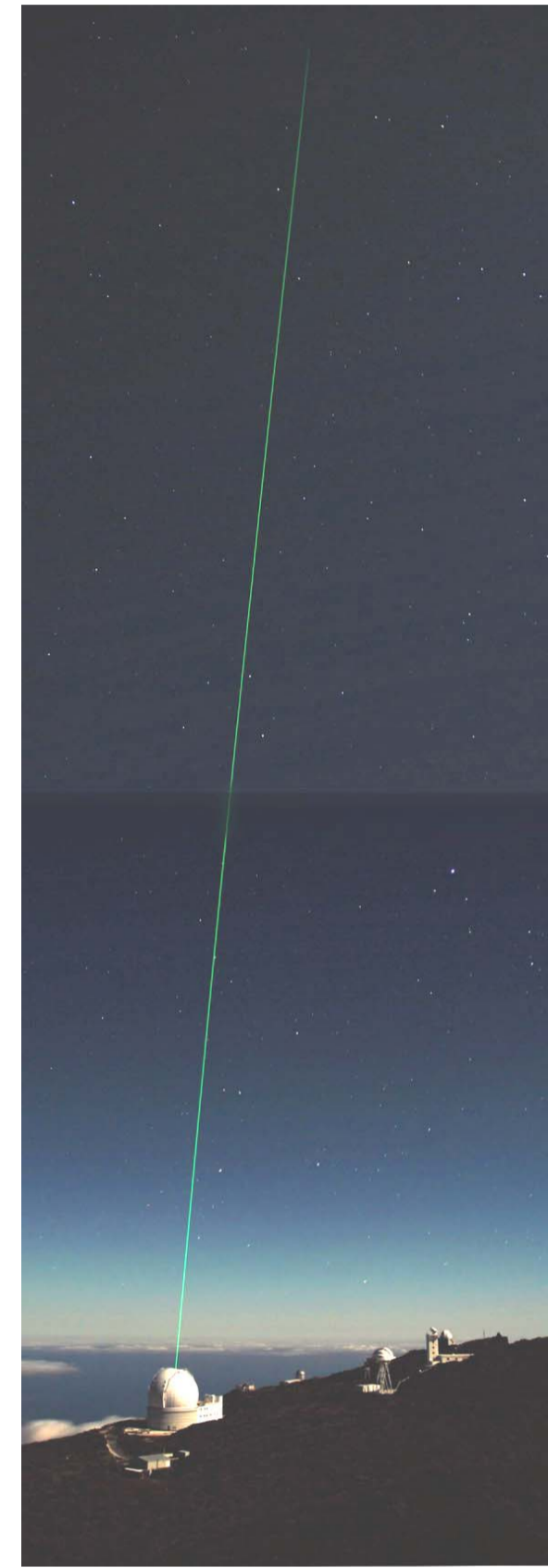
Isaac Newton Group, Apartado De Correos 321, 38700 Santa Cruz de La Palma, Islas Canarias, SPAIN



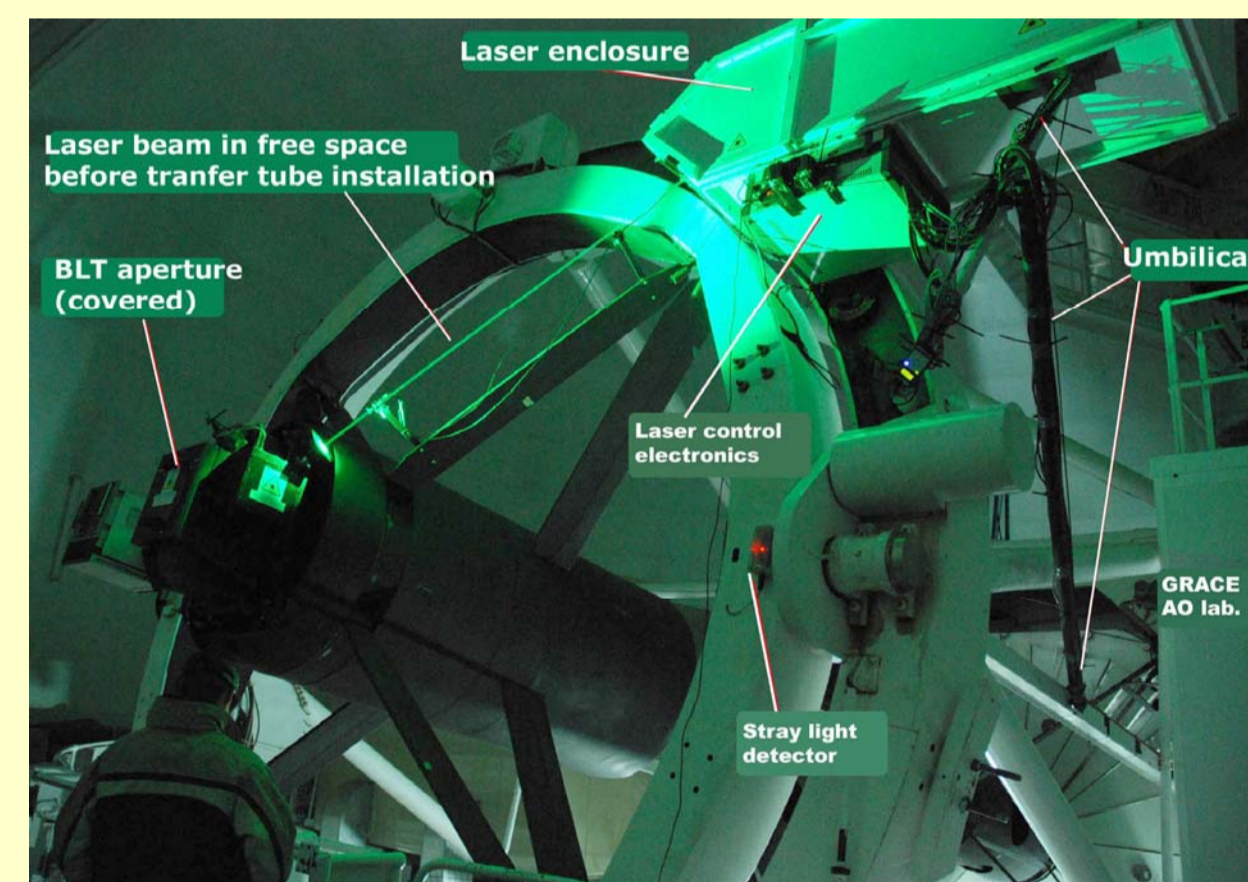
The Ground-layer Laser Adaptive optics System provides a Rayleigh Laser Guide Star upgrade to the existing NAOMI AO system at the 4.2-m WHT on La Palma. We expose here the recently commissioned optomechanical specific to the LGS launch system, LGS safety systems and LGS Wave Front Sensor.



View of the WHT tube in access park position. The BLT, transfer tube and laser enclosure are visible along with GRACE, the Nasmyth AO environment and the AO facility NAOMI.



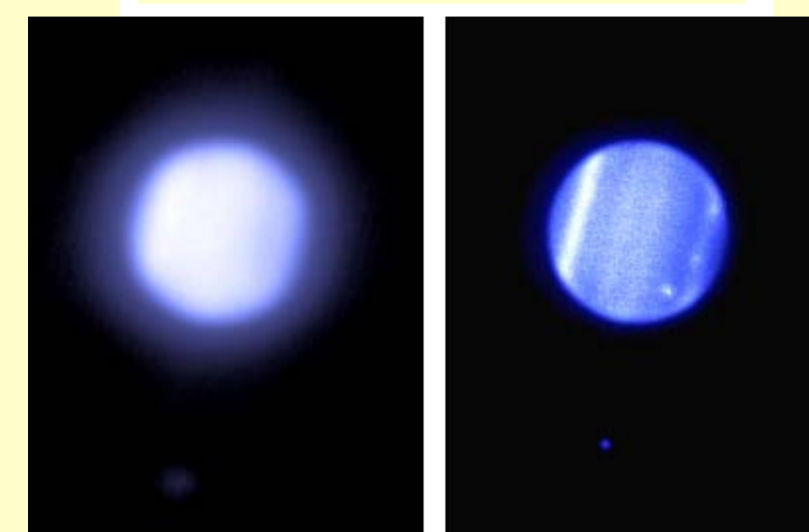
Left: adjusting remotely the M4 laser steering mirror by projecting the laser spot on the dome. Right, up: M4 misaligned, the centre of the Gaussian beam is outside the BLT field of view. Right, down: after M4 position is optimised for 50° elevation. BLT removal (e.g. for a run at Prime) is very repeatable and M3/M4 adjustments are usually not necessary. The mean laser beam wander on sky is less than 0.4".



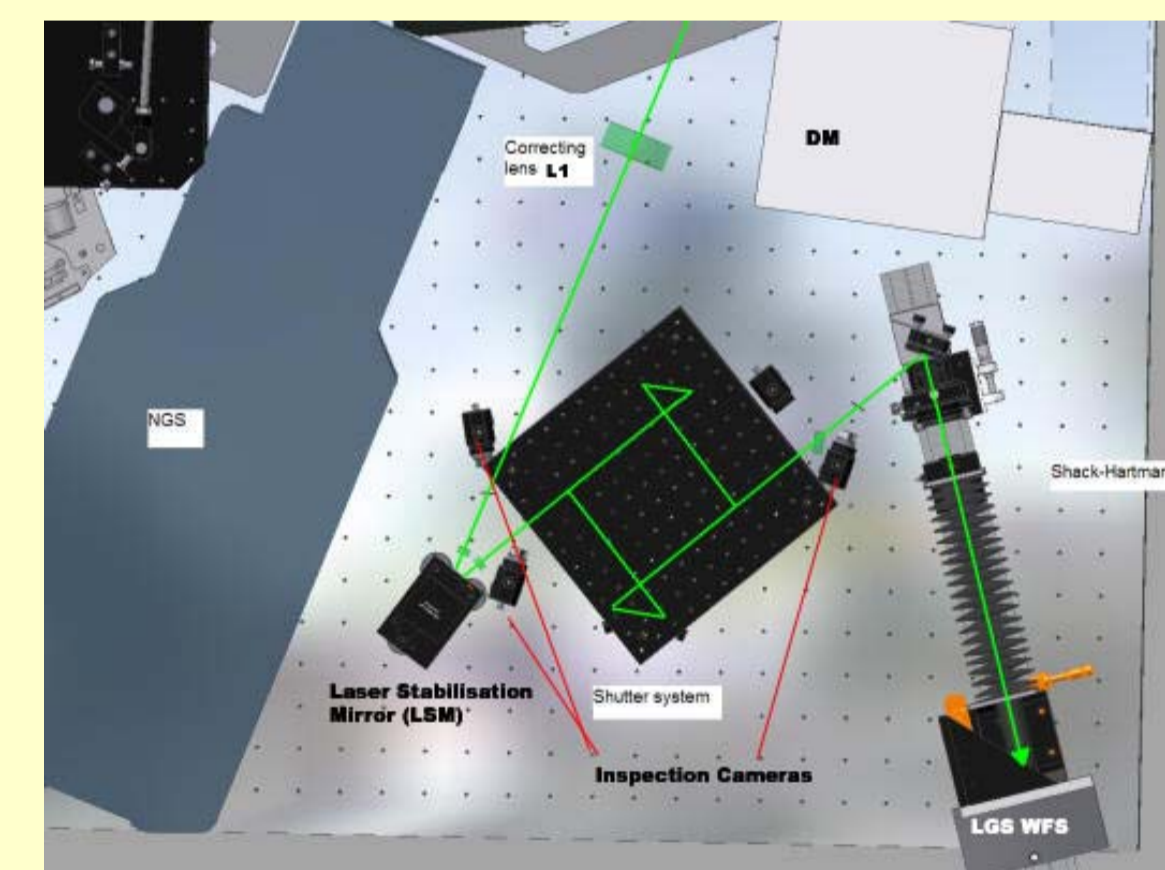
Laser operating during the late stages of beam alignment, when the beam transfer tube was not yet installed. This long exposure shot shows the laser beam, over a spider vane, from the laser enclosure to the BLT side entry.



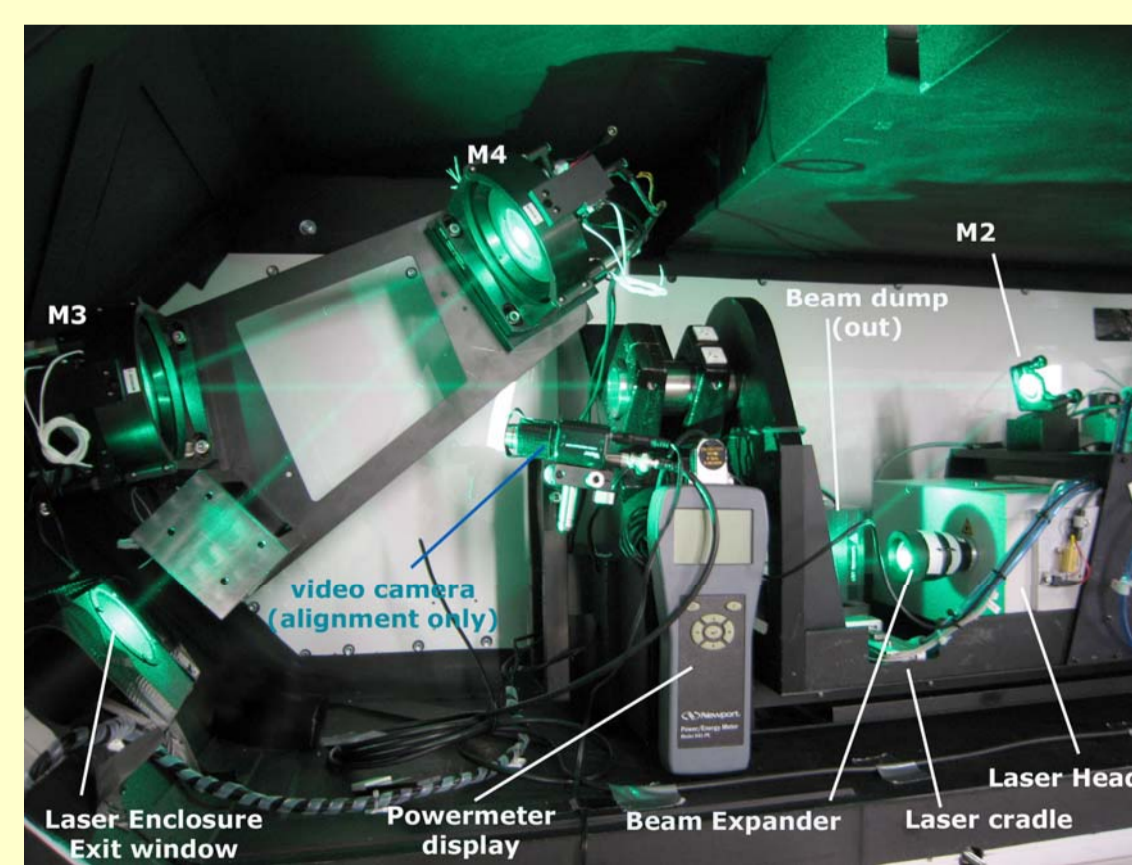
Devices from the laser Safety System.



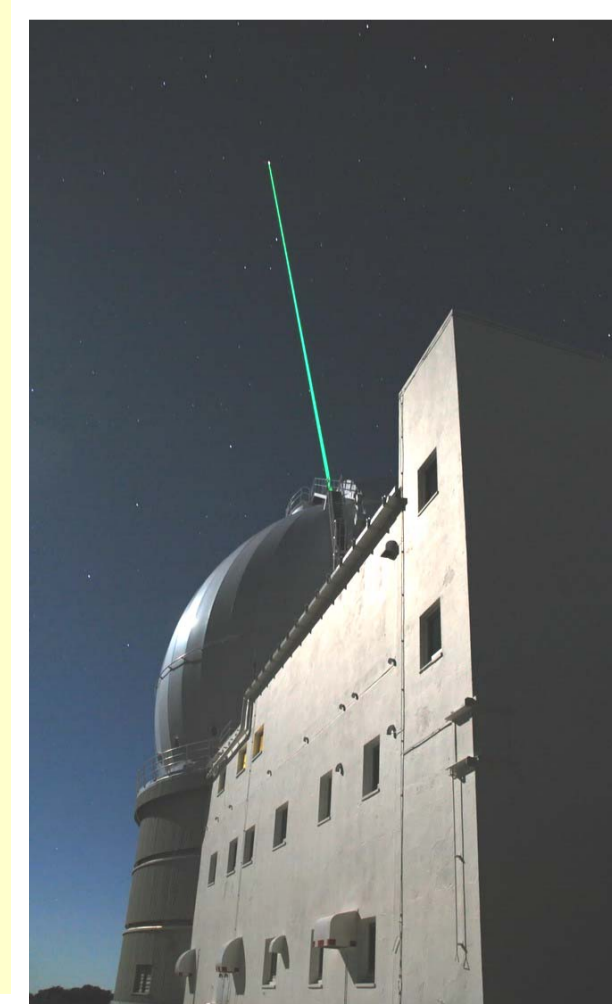
Uranus in H band with the IR camera INGRID. Right: AO correction to 0.15"



The LGS WFS optical path and all new elements



Laser head, and beam hitting M1 (closest to laser head and hidden in this view), M2, M3 and M4 steering mirrors, before leaving the laser enclosure in the lower left corner. The energy detector acts as a beam dump. A small video camera was used for alignment (it was then removed).



CONCLUSIONS

Only 3 months after the laser was received on La Palma (May 2007), all optical and mechanical subsystems were installed and aligned. In July 2007 the WFS optical path was completed and the AO loop could be closed on the laser early August; subsequently thorough on-sky tests were carried out to explore the LGS AO parameter space and determine its performance. The picture of the planet Uranus in H-band was obtained with LGS AO correction during the September commissioning run and shows correction to 0.15". The LGS facility will be available for science at the beginning of semester 2008B in August.