ANU Guide Star Laser Interface

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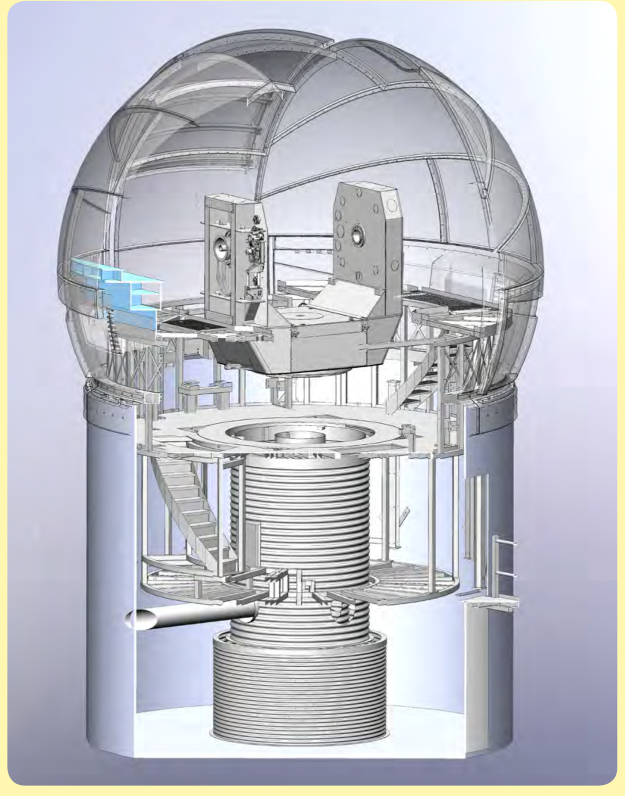
Australian National University

Project Summary

Abstract: Context. What you did. How you did it. The results you obtained. What do they mean? Write this at the end.



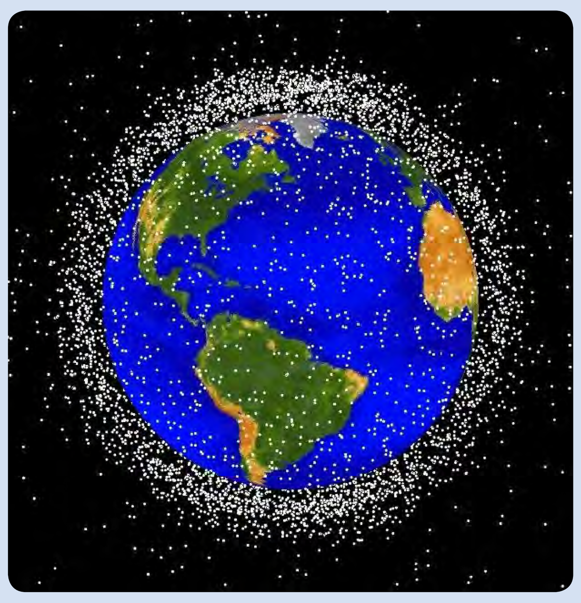
The Adaptive Optics group at the Australian National University (ANU) Research School of Astronomy and Astrophysics (RSAA) have teamed up with EOS Space Systems to equip the EOS laser space debris tracking station located at the ANU Mount Stromlo Observatory with an Adaptive Optics Demonstrator (AOD).

The AOD project is a joint project whereby ANU provides LGS

Project Goals

- Determine requirements for interface between ANU 1.8m telescope and three guide star lasers
- Design a conceptual mounting solution

Background

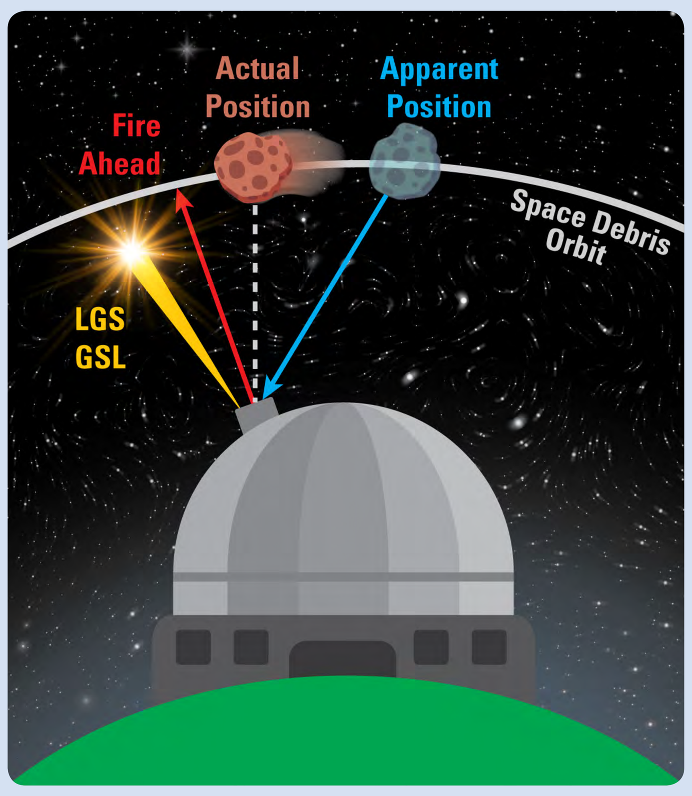


Space debris are objects in orbit that do not serve a useful purpose. The US Space Surveillance Network currently tracks **more than 13,000 large objects** (>10cm). It estimated that there are over 500,000 small objects (between 1 and 10cm), and millions the size of a grain of sand.

These objects pose a significant collision risk for orbital infrastructure such as satellites and the ISS.

Tracking Space Debris

The fundamental principle of Einstein's Theory of Relativity is that light travels at a very fast but finite speed. Consequently, when we observe something we actually see an apparent position - an image from the past. When tracking moving objects such as space debris, a tracking laser must be fired ahead of the actual target position to account for target movement and finite light travel time. As this light passes through the Earth's turbulent atmosphere, it becomes distorted and causes blurry images to be captured on telescope tracking instrumentation.



A **Laser Guide Star (LGS)**, created by propagating a **Guide Star Laser (GSL)** at 589nm into the atmosphere, acts as a stable artificial star reference for **adaptive optics (AO)** corrections, which are performed by cleverly deforming internal telescope mirrors in real-time. As a result, this will allow the AO-equipped ANU/EOS Space Systems laser space debris tracking station, based on Mount Stromlo in Canberra, to track smaller and more distant debris.

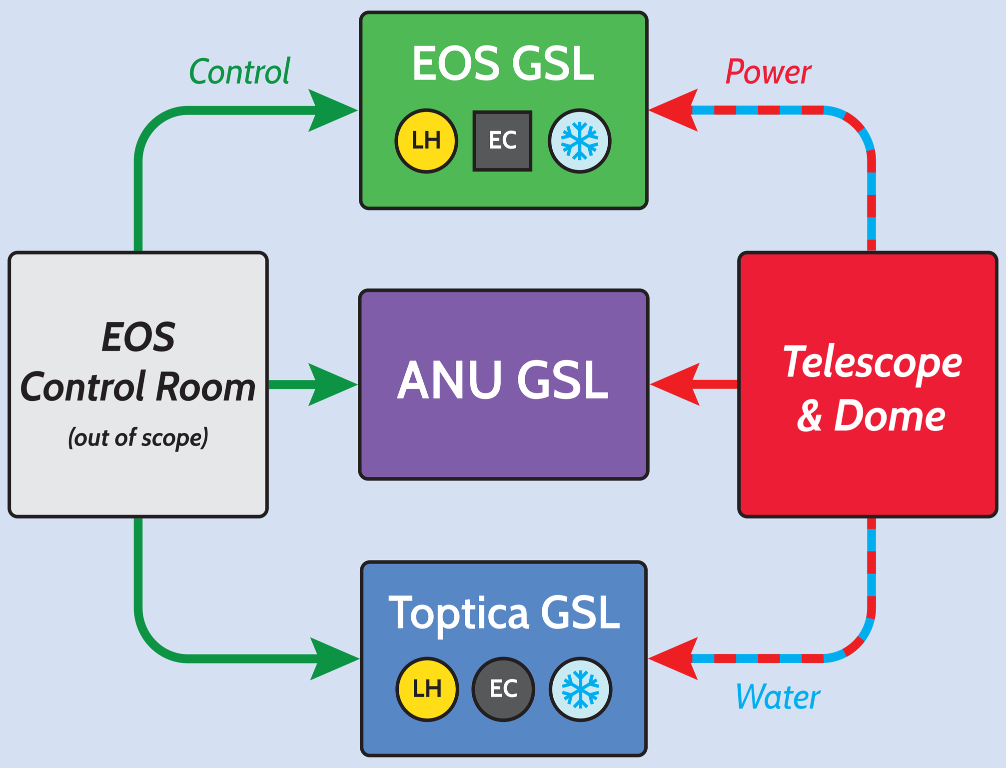
Top-Level System Architecture

The interfaces and constraints of the system that fall within the definition of the Scope Statement are outlined from a top level perspective.

There are four major groupings of interfaces within the top level System Interface

1. 1.8m telescope
2. EOS GSL
3. Toptica GSL
4. ANU GSL

Each of these interfaces are further broken down to Physical, Electrical, Optical, Logical and Environmental.



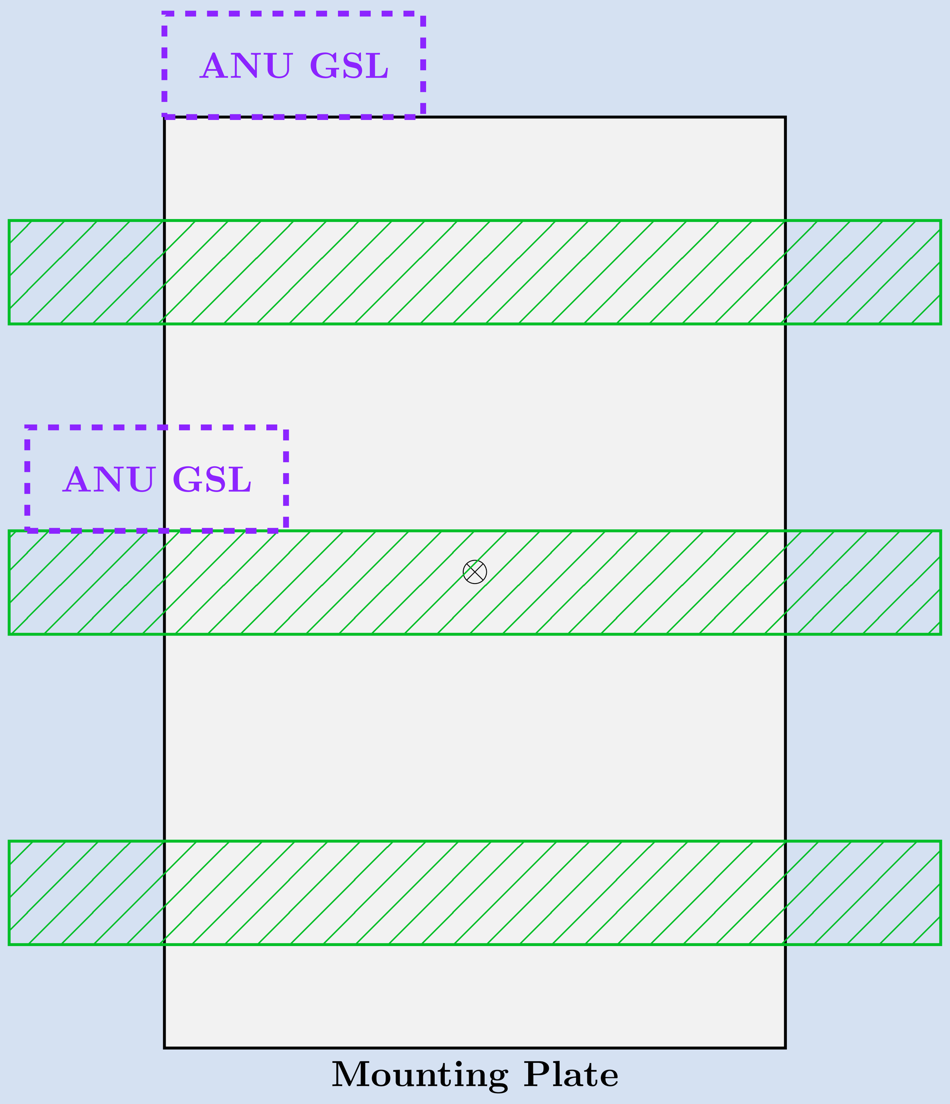
System Specifications

Some explanation if needed. More explanations. Until the end of the earth! Some explanation if needed. More explanations. Until the end of the earth! Some explanation if needed. More explanations.

	EOS GSL	Toptica GSL	ANU GSL	Total	Required by Telescope/Dome
Laser Head Mass (kg)	450±150	80	??		<2000
Laser Head Size (mm^3)	(1800×800×800)	(925×720× 440)	??		??
Electronics Cabinet Mass (kg)	??	600	-		1
Electronics Cabinet Size (mm^3)	(500×500×1750)	(930×910×1726)	-	(500×500×1750) + (930×910×1726)	2
Cooler Mass (kg)	30 + 40	-	-	30 + 40	1
Cooler Size (mm^3)	(653×483×26) + (487×232×620)	-	-	(653×483×26) + (487×232×620)	2
Power Draw (W)	2400+4600+2000+1500	700→2000	??		??
Power Sockets	2±1+1+1+1+1	??	??		14?

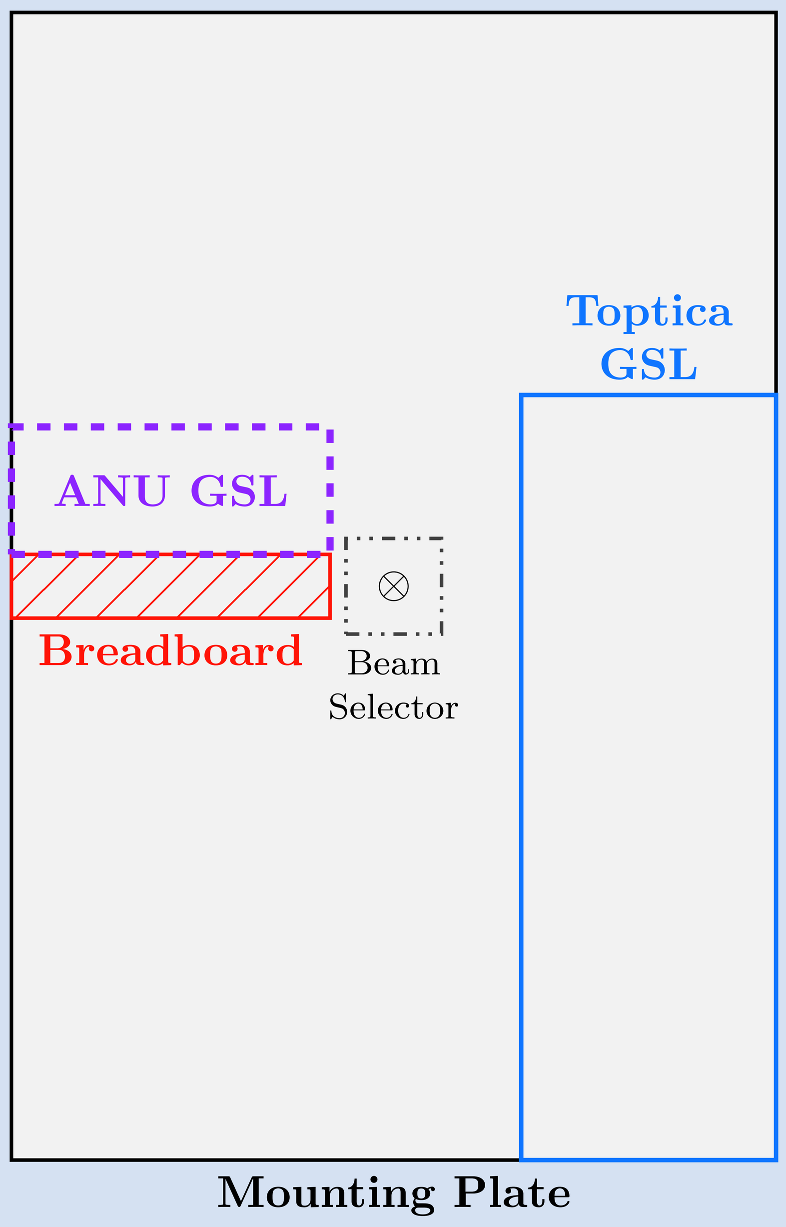
Design Concept 1

Meatball sausage ball tip, pancetta ham bacon tri-tip meatloaf kevin flank spare ribs corned beef. Porchetta capicola jowl shank, shankle sausage chuck chicken bacon ground round pastrami beef. Pig bresaola meatloaf fatback, beef frankfurter pork belly drumstick spare ribs shoulder beef ribs jerky boudin corned beef sausage. Turducken filet mignon ball tip shankle bacon rump cow corned.



Design Concept 2

Jowl prosciutto meatball capicola cupim brisket fatback leberkas bacon pork chop pancetta picanha beef. Short loin turducken shankle ball tip bacon sirloin pork belly t-bone meatball tenderloin kielbasa corned beef. Drumstick fatback meatloaf tenderloin, beef frankfurter pork belly drumstick spare ribs shoulder, shankle sausage chuck chicken beef, swine brisket shoulder short ribs pork duck.



Conclusion and Handover

Basic text

SERC Research Projects

For more information about this project visit www.serc.org.au/research

About the Project Team

We are too cool for school. Nobody can keep up with us. You can run but you can't hide. We will strike at midnight.

Acknowledgements

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