



# Giant Magellan Telescope

Presented by

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# GMTO Corporation

<https://giantmagellan.org/scientific-instruments/>



# US-ELT Program

The United States Extremely Large Telescope Program (US-ELTP) is a joint endeavor of:



Giant Magellan  
Telescope



NSF's NOIRLab



Thirty Meter  
Telescope

# GMTO Founders

<https://giantmagellan.org/founders/>



- 13 International Consortium of leading universities and science institutions
- 5 countries

## Founders

The Giant Magellan Telescope is made possible by an international consortium of thirteen leading universities and science institutions representing five countries. Whether building key instrumentation technology or providing philanthropic support to forward space science, the consortium is committed to the success of the Giant Magellan Telescope.

MAP VIEW LIST VIEW





## The Giant Magellan Telescope

<https://giantmagellan.org/explore-the-design/>

# WORLD'S MOST POWERFUL TELESCOPE

The Giant Magellan Telescope is the largest Gregorian optical-infrared telescope in history. It will use seven of the world's largest mirrors to see farther into deep space than ever before. Its unique design will produce the highest possible resolution of the Universe over the widest field of view. This extraordinary image clarity will enable scientists around the globe to obtain new clues to the fundamental nature and evolution of the Universe — from searching for signs of life on distant exoplanets to investigating the cosmic origins of chemical elements.

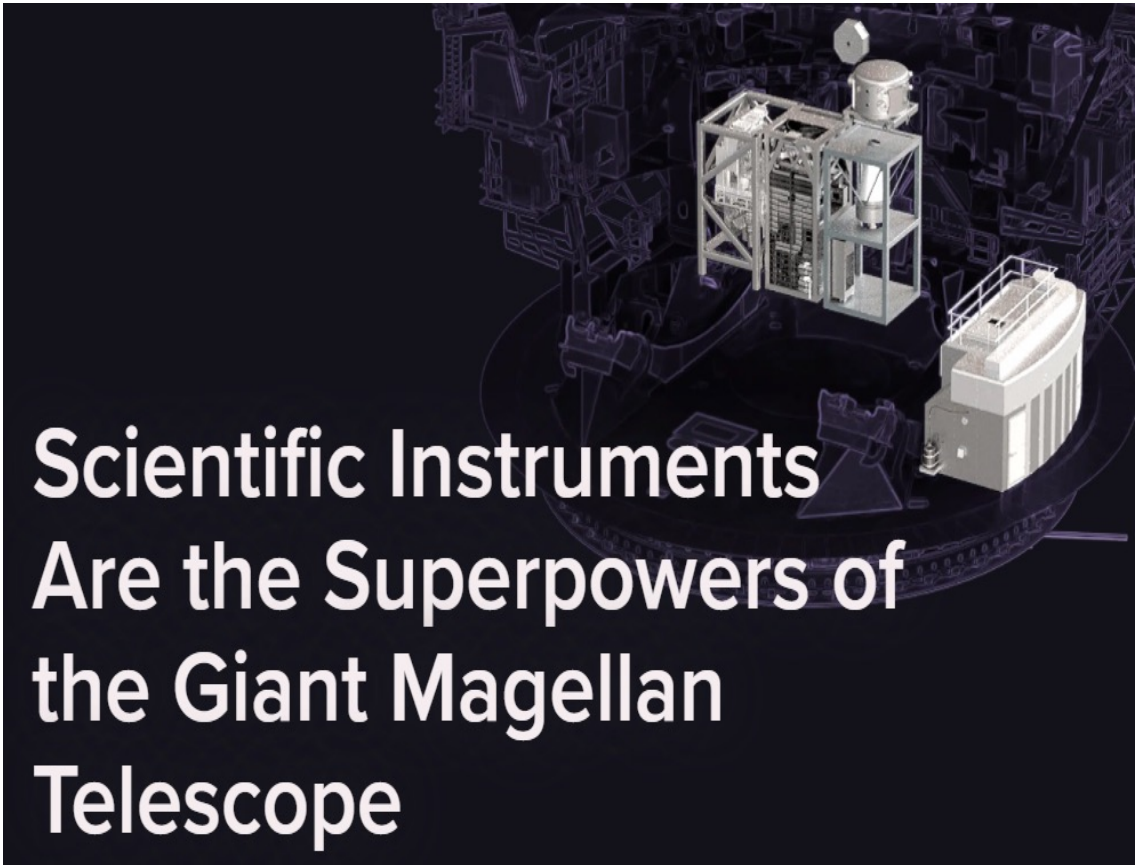


# Scientific Instruments

<https://giantmagellan.org/scientific-instruments/>



- The instruments allow astronomers to unlock the secrets of the universe by dissecting light into spectra and providing detailed chemical analyses of celestial objects and their origins.
- The Giant Magellan Telescope can accommodate up to ten instruments, more than any other telescope.
- Each one has a unique ability to explore the unknown: from analyzing a distant planet's atmosphere in search of life to looking back in time to when the universe first formed.
- The discoveries they make could rewrite history as we know it.

A 3D rendering of various scientific instruments mounted on a complex metal structure, likely part of the Giant Magellan Telescope. The instruments are shown in a dark, blue-tinted environment, with some components highlighted in white and yellow. The text "Scientific Instruments Are the Superpowers of the Giant Magellan Telescope" is overlaid in large white font on the right side of the image.

**Scientific Instruments  
Are the Superpowers of  
the Giant Magellan  
Telescope**



# Observatory Site (Las Campanas, Chile)

<https://giantmagellan.org/location/>



TELESCOPE | TIMELINE | GALLERY | PARTNERS | ABOUT | NEWS & EVENTS | 🔍

FOR SCIENTISTS

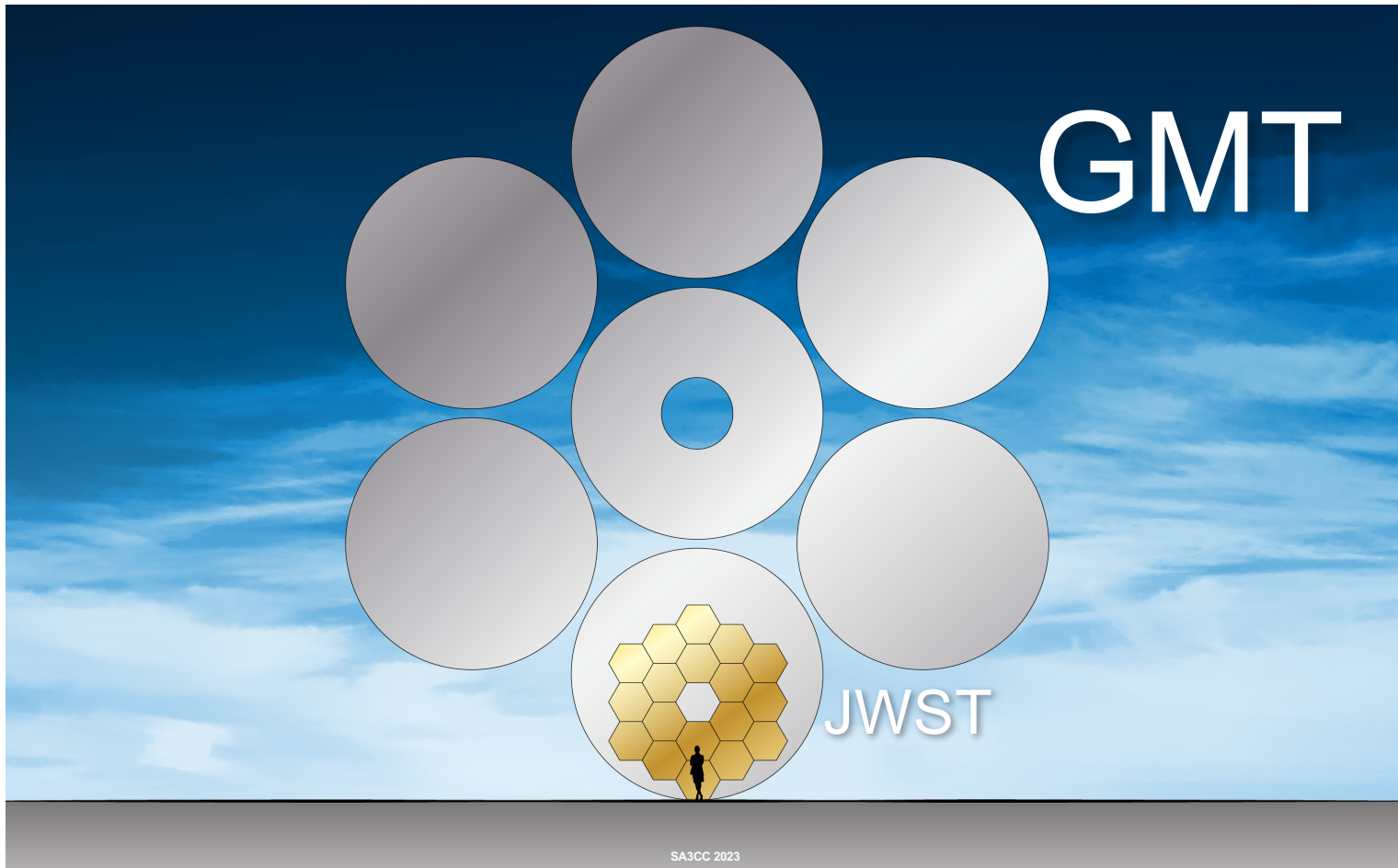


# Giant Magellan Telescope (GMT) - Timeline

- 2004 – GMT Conceptual Design
- 2005 – 1st Primary Mirror Cast
- 2009 – Formation of Consortium
- 2010 – Carnegie Institution for Science and The University of Chicago Joins as Founder
- 2011 – Site Selection (Atacama Desert, Chile)
- 2012 – 2nd Primary Mirror Cast and Start of Construction
- 2013 – 3rd Primary Mirror Cast
- 2014 – Design Finalized, Brazil's Sao Paulo Research Foundation Joins as Founder
- 2015 – 4th Primary Mirror Cast
- 2017 – 1st Primary Mirror Finalized and Fifth Primary Mirror Cast
- 2019 – Site Excavation and 2nd Primary Mirror Finalized
- 2020 – NSF Grant Awarded (prototyping and testing of powerful optical and infrared technologies.)
- 2021 – 6th Primary Mirror Cast and Weizmann Institute of Science Joins as Founder

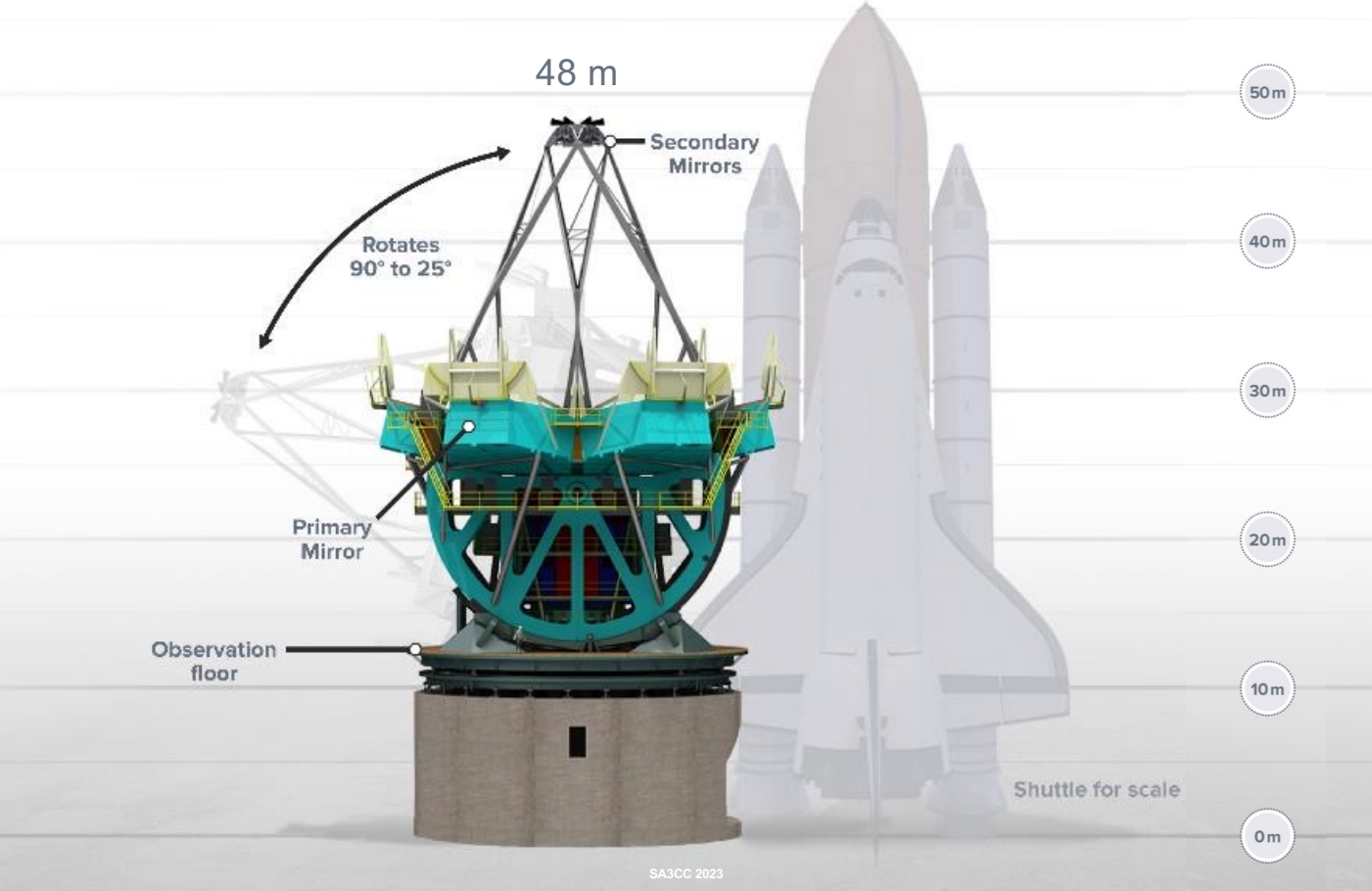
# GMT Size Comparison

(JWST = 6.5m; GMT = 24.5m ~ 80ft)





# Giant Magellan Telescope Configuration



# GMT Size Comparison (Rose Bowl Stadium)



IDOM Kickoff Meeting, 16 Jan 2018

SA3CC2023



# Primary Mirror Segment 6 Unveiling

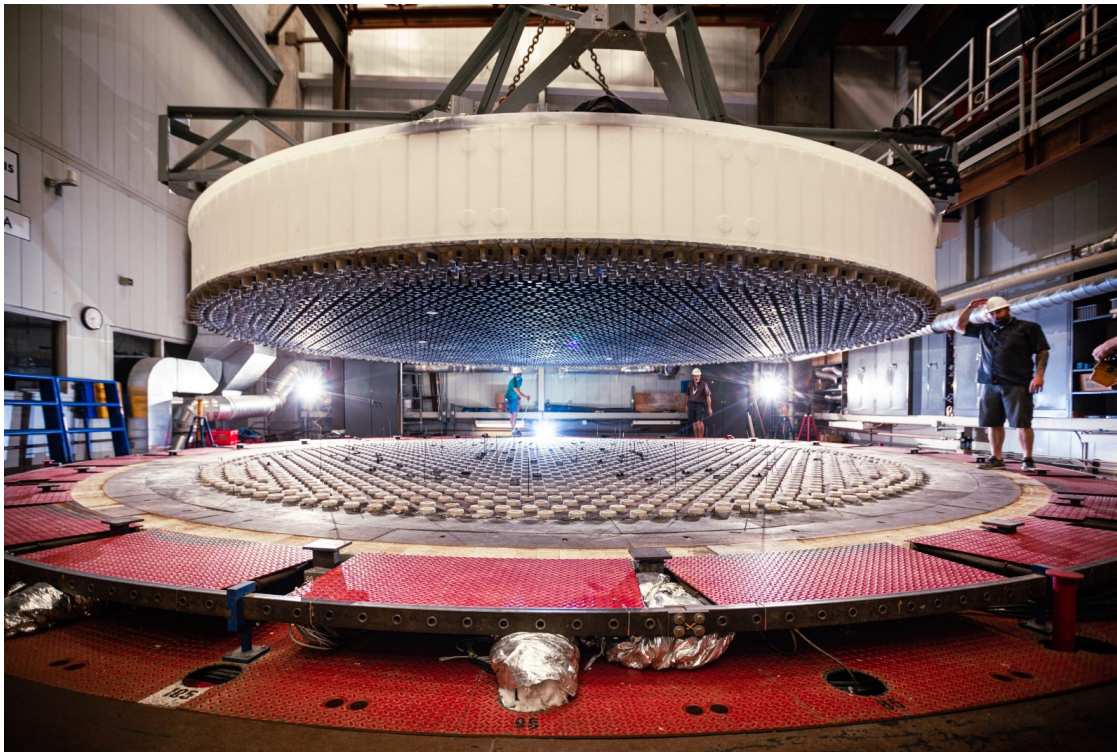


**August 2021**

**The casting process began in March 2021 and has been annealing over the last few months.**

**The mirror will undergo inspection and cleaning before being carefully lifted from the furnace floor and moved across the Lab into the integration hall for rear-surface generation.**

## Primary Mirror Segment 6 Move



Using a lifting fixture bonded to the mirror's front surface, segment 6 was carefully lifted from the furnace floor and moved into the integration hall for rear-surface generation.

Richard F. Caris Mirror Lab at the University of Arizona in late August



# Cross Section

<https://giantmagellan.org/gallery/telescope-renderings/#data-fancy>



GIANT MAGELLAN  
TELESCOPE



# Telescope Rendering

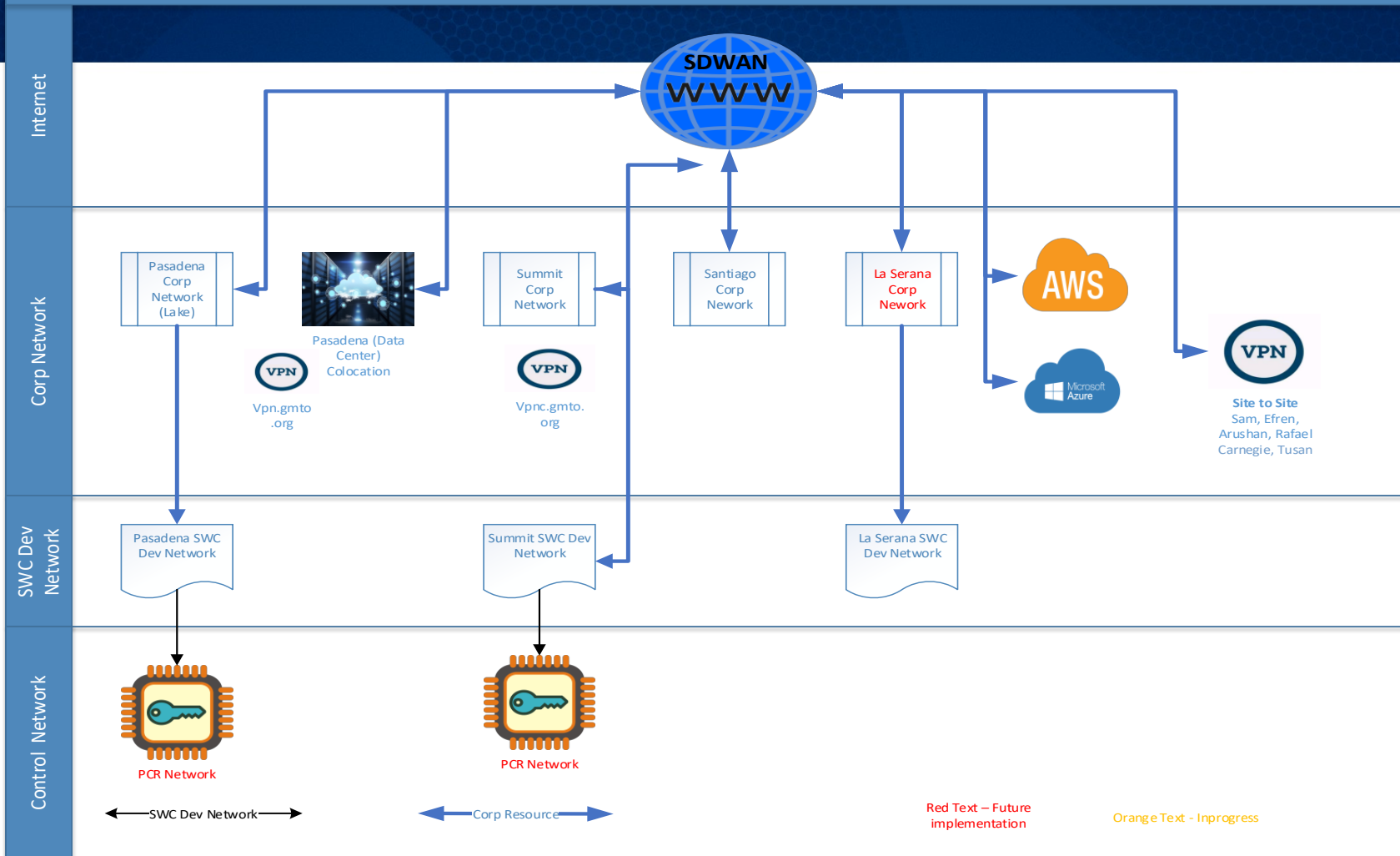
<https://giantmagellan.org/gallery/telescope-renderings/#data-fancybox-7>



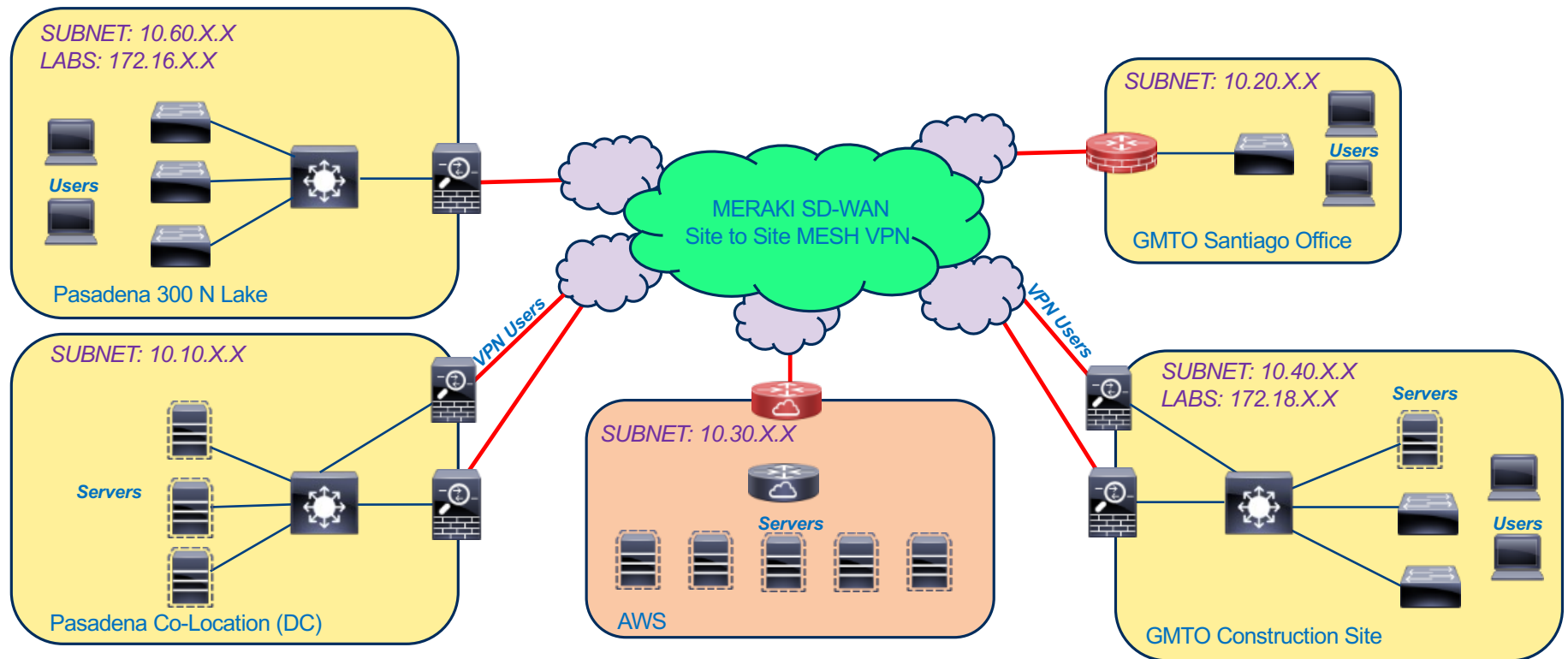
Daytime interior rendering of the telescope viewing platform. Image credit: Giant Magellan Telescope – GMTO Corporation.



# GMTO Infrastructure



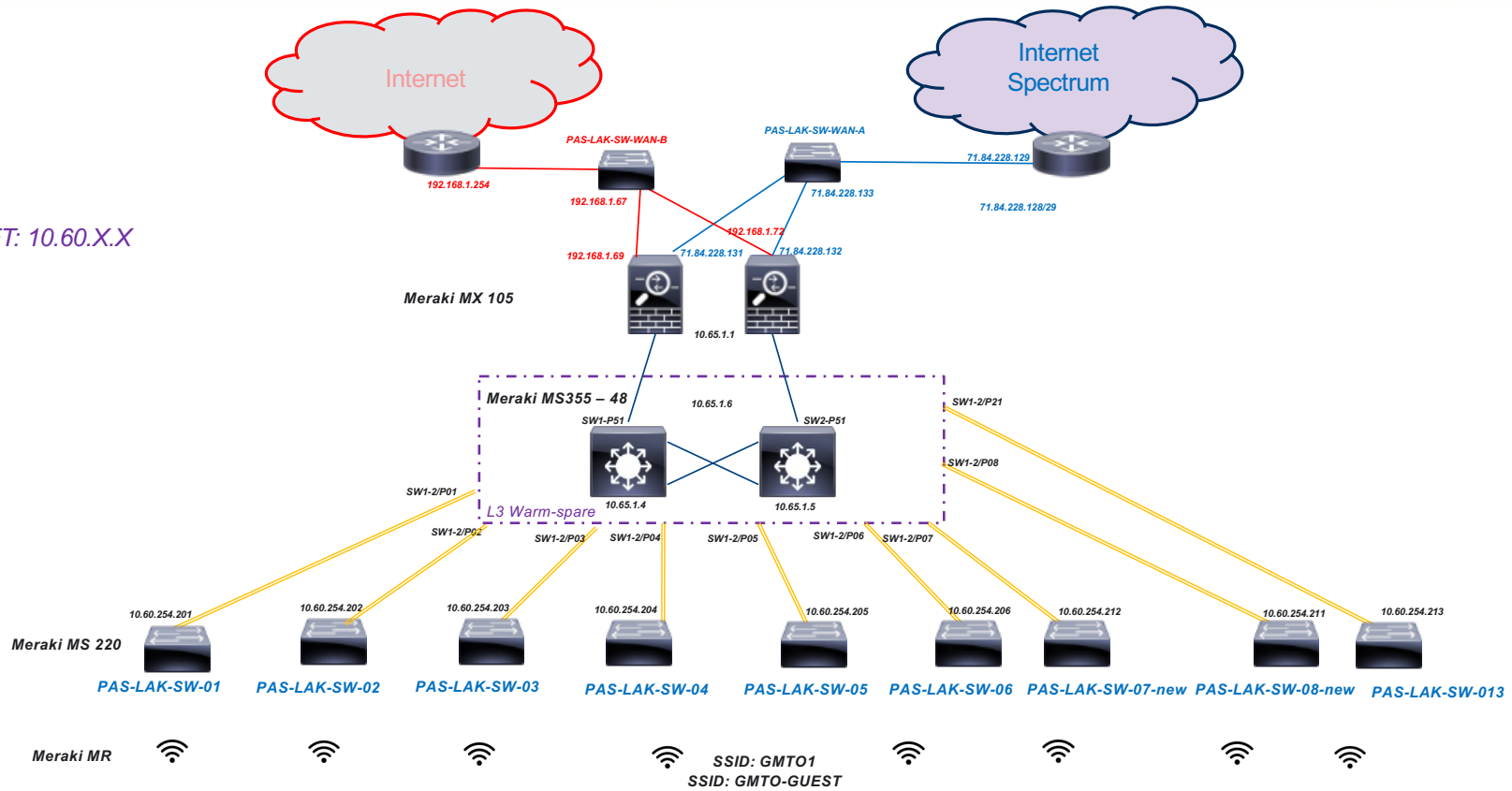
# GMTO Network – Logical diagram





# GMTO 300 N Lake current network – Physical diagram

SUBNET: 10.60.X.X



## Science Data

- Projected ~ 31 TB of Science data per year
- First Light ~ 2029
- Leverage nearby data center (NSF research/education network)
- **Fiber from Summit to La Serena through new power lines**
- **Data Location? NOIRLab?**



# GMTO Cybersecurity – Data Center

## Pasadena Data Center

- **Data**
  - Backup locally every hour
  - Backup to Backblaze Nightly (cloud)
- **Pasadena Data Center replicate to the Summit (LCO or NOIRLab)**

## AWS Services

- **Data are backup nightly**
- **Pasadena Services moving to AWS**

# Cybersecurity - TrustedCI Framework



<https://www.trustedci.org/framework>

## Mission

The mission of Trusted CI is to lead in the development of an NSF Cybersecurity Ecosystem with the workforce, knowledge, processes, and cyberinfrastructure that enables trustworthy science and NSF's vision of a nation that is a global leader in research and innovation.

SA3CC2023









**Thank You!**

<https://www.giantmagellan.org>