

# GMT Project 2022

2023. Jan. 17. (Tue)

Byeong-Gon Park

# A Brief Summary

Despite COVID-19 pandemic, GMT Project has made progress in terms of;

- seeking new partners and funding
- technical development
- NSF-led design reviews to get US government support for US-ELT program

# Contents

- Partners and Governance
- Project Status
- Preliminary Design Review

# Partner Institutions (Founders)

• Weizmann Institute of Science

• Korea Astronomy and Space Science Institute

• Australian National University  
Astronomy Australia Limited

Arizona State University  
University of Arizona  
University of Texas at Austin  
Texas A&M University

The University of Chicago  
Harvard University  
Carnegie Institution for Science  
Smithsonian Institution

The São Paulo Research Foundation – FAPESP  
Giant Magellan Telescope



# Korean Delegates

- Founder Representative & Board of Directors

- Byeong-Gon Park (박병곤)

- Science Advisory Committee

- Yujin Yang (양유진)

- Finance Committee

- Soyoung Hong (홍소영)



# Fundraising in 2022

## \$205 Million Investment Accelerates Construction of the Giant Magellan Telescope

PRESS RELEASE CONSTRUCTION

August 02, 2022



# Primary Mirror Fabrication

S6 casting completed & S3 polished to specification





# Primary Mirror Subsystem

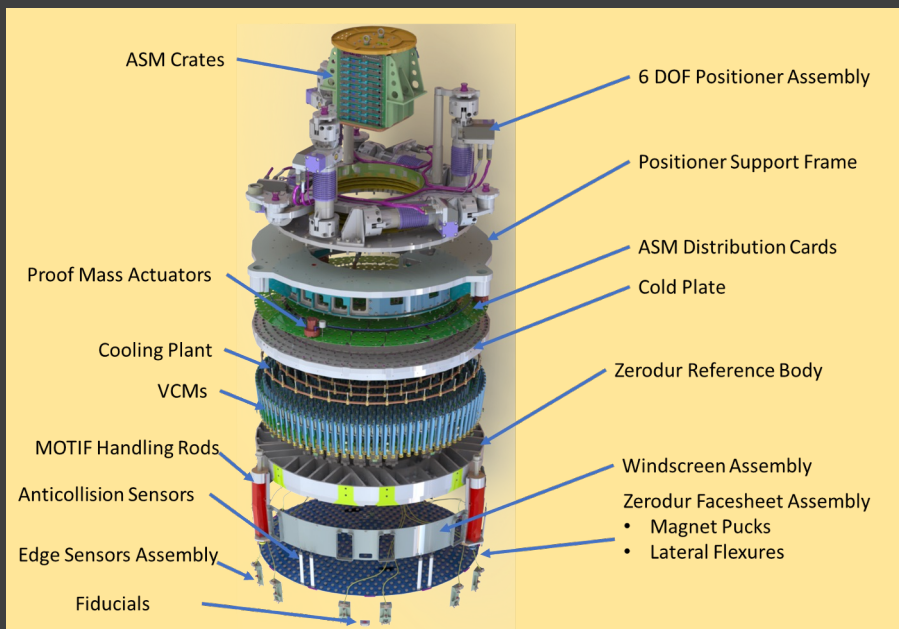


Test Cell qualification unit (with steel mirror surrogate)



Commanded lift & translation of mirror accomplished

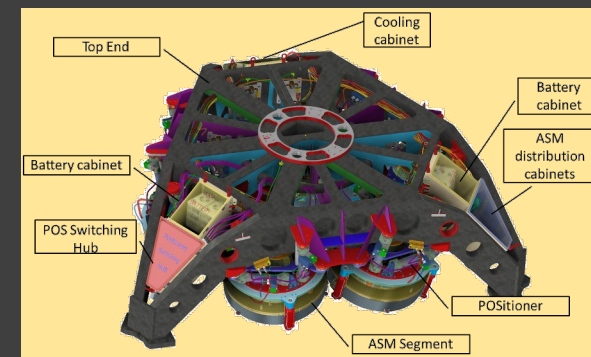
# ASMS (Adaptive Secondary Mirror Subsystem) FDR completed & fabrication in process



First off-axis ASM in fabrication



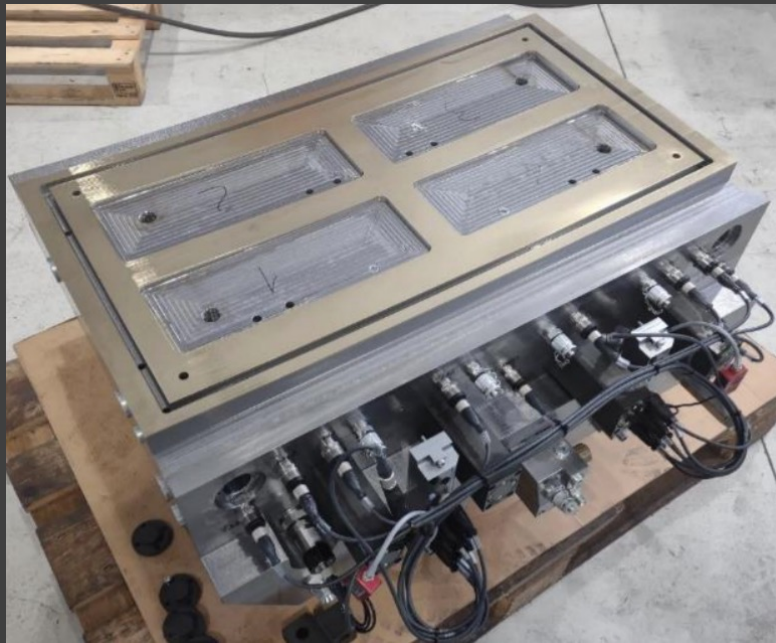
Prototype hexapod positioner actuator



ZeroDur ASM reference body being machined



# Mount prototyping OHB Digital Connect & Ingersoll Machine Tools



Hydrostatic bearing pad



Mirror cover structural load test

# Mount prototyping OHB Digital Connect & Ingersoll Machine Tools



GIR bearing segment performance test



Mirror cell positioner alignment & repeatability test



Mount FDR : plan in Jan. 2023, fabrication will follow



**New 10m-wide gantry milling machine @IMT**



Mount FDR : plan in Jan. 2023, fabrication will follow

**New assembly hall with azimuth assembly pit**



Mount FDR : plan in Jan. 2023, fabrication will follow

**Azimuth assembly pit**

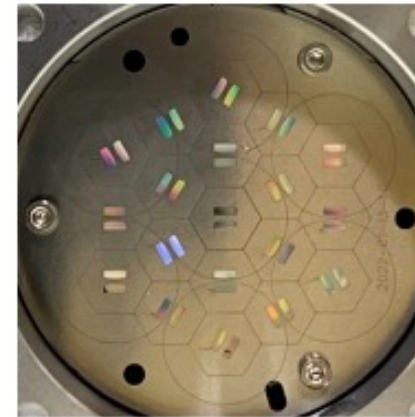




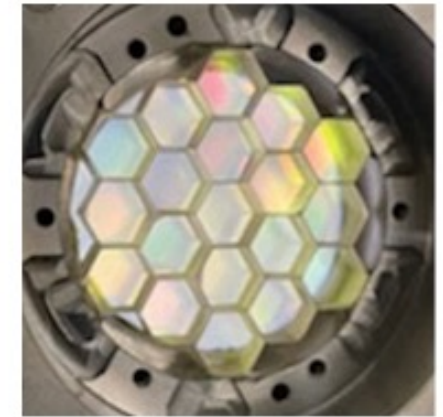
# Acquisition & Guiding Wavefront Sensor Phasing Segments to Function as a Single Mirror

- Final design nearly completed
- Prototype being fabricated for Wide Field Phasing Testbed at SAO

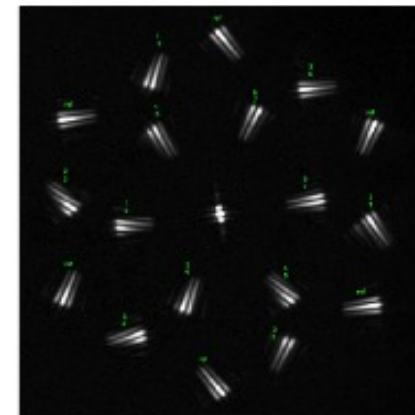
Pupil mask



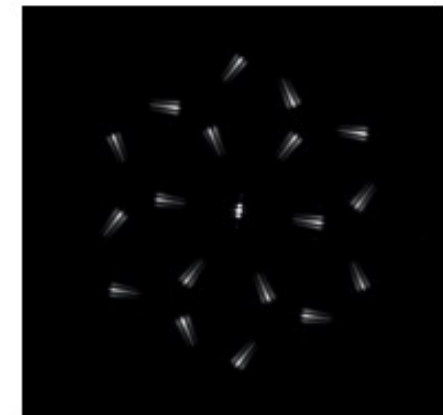
Prisms behind mask



Initial condition



After segment phasing control



Enclosure design is progressing  
IDOM (new A&E contractor) has completed Phase 1 Design study





Site is ready to resume major construction





# Science Instruments

## Prototyping & long lead risk reduction underway

### ● Final Design Phase

#### ➤ GMTO Consortium Large Earth Finder (GCLEF)

✓ Spectrograph FDR in 2018; front-end FDR in 2021; long lead fabrication

GCLEF Red Lenses



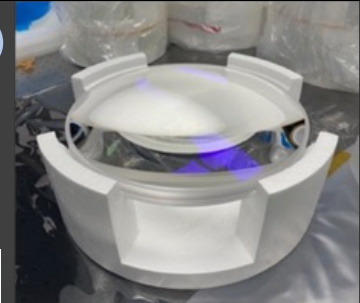
### ● Preliminary Design Phase

#### ➤ GMT Multi-object Astronomical and Cosmological Spectrograph (GMACS)

#### ➤ GMT Integral Field Spectrograph (GMTIFS)

#### ➤ GMT Near Infrared Spectrograph (GMTNIRS)

#### ➤ Commissioning Camera (ComCam)

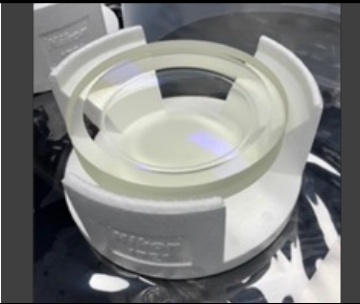


### ● Conceptual Design Phase

#### ➤ Many Instrument Fiber System (MANIFEST)

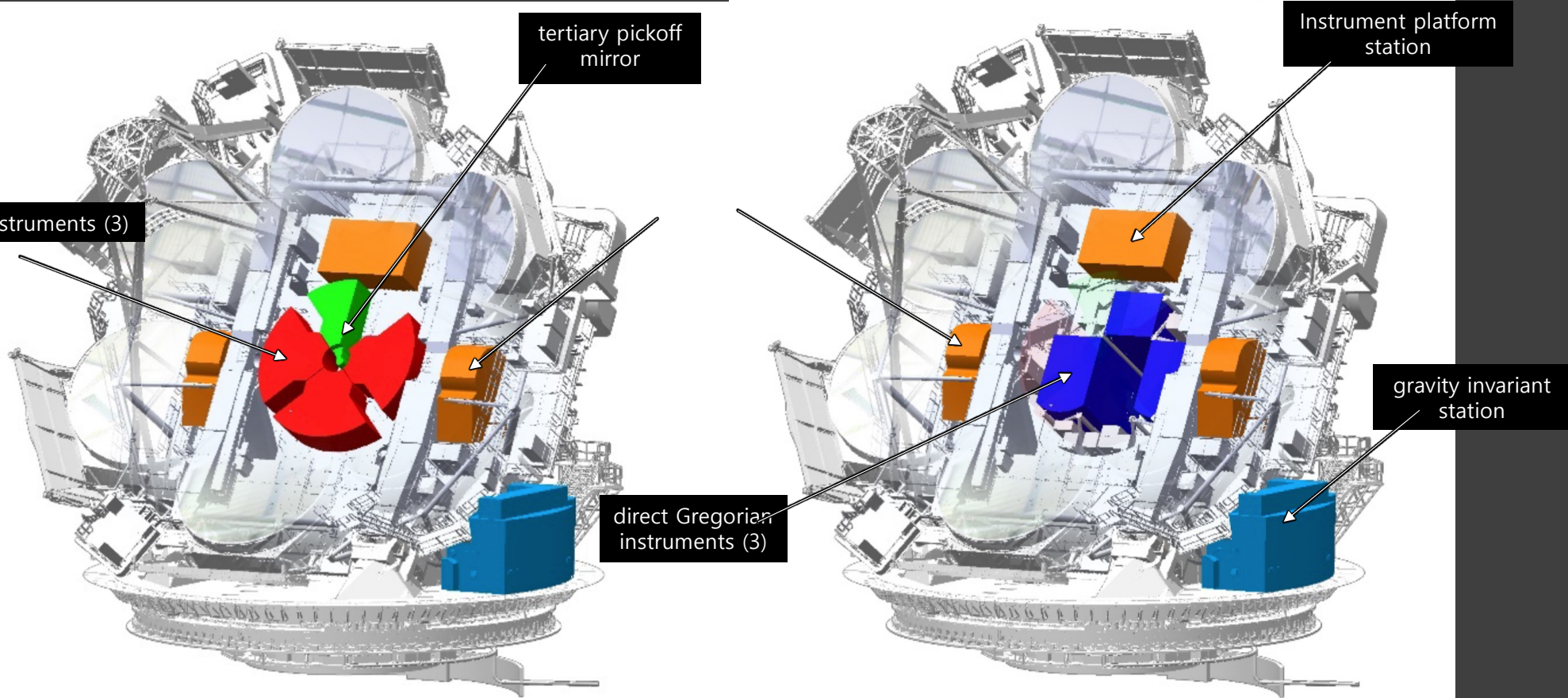


GMTNIRS silicon immersion gratings



# Telescope Design

## GIR modified to accommodate 2 large and 1 small DG instruments





# SPIE Astronomical Telescopes Conference

17-22 July 2022, Montreal, Canada

- GMT was well represented with papers, posters, and presentations
- Booth in exhibit area was well attended

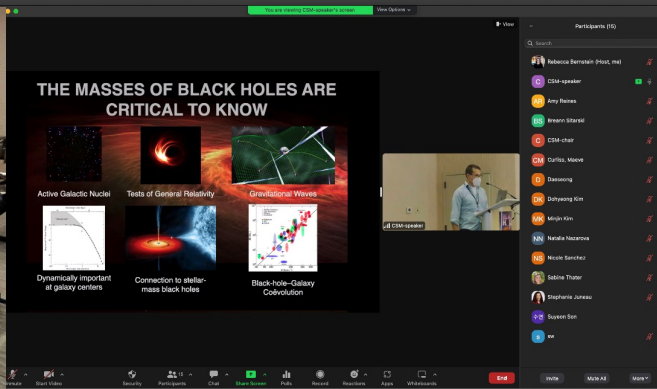




# GMT Community Science Meeting 2022

## Aug. 31. - Sep. 2, Sedona, AZ

- Meeting held in hybrid format
- Attendee statistics
  - countries : 16
  - total : 103 (in-person 72)
  - men : 59, women : 44
  - 12 virtual attendance from Korea



# BLACK HOLES

## AT ALL SCALES

EIGHTH ANNUAL  
GIANT MAGELLAN TELESCOPE COMMUNITY SCIENCE MEETING

AUGUST 31-  
SEPTEMBER 2, 2022  
Hilton Sedona Resort at Bell Rock  
Sedona, Arizona

**MEETING SYNOPSIS**  
Black holes are among the most extraordinary objects in the Universe. Pivotal new results include the detection of gravitational radiation from merging black holes and the imaging of event horizon scale regions. This conference will focus on dynamics as a way to learn about black holes of all masses, and will include Sgr A\* mass measurements, demographics, gravitational wave events, accretion disk dynamics, and tidal disruption events. Experts will highlight key observational and theoretical questions, and motivate future directions, particularly in the era of extremely large telescopes.

**INVITED SPEAKERS**  
Richard Anantun <sup>U of Arizona</sup>, Katie Auchettl <sup>U of Michigan</sup>,  
Misty Bantz <sup>CU</sup>, Jillian Bullock <sup>U of Colorado</sup>,  
Rebecca Bernstein <sup>U of Michigan</sup>, Laura Blecha <sup>U of Florida</sup>,  
Jason Dexter <sup>U of Michigan</sup>, Maya Fishbach <sup>U of Michigan</sup>,  
Savi Gazi <sup>U of Michigan</sup>, Jenny Greene <sup>U of Michigan</sup>,  
Kayhan Gultekin <sup>U of Michigan</sup>, Kelly Holley-Bockelmann <sup>U of Michigan</sup>,  
Nora Litzgendorf <sup>U of Michigan</sup>, Chung-Pai Ma <sup>U of Michigan</sup>,  
Morgan MacLeod <sup>Harvard</sup>, Chiara Mingarelli <sup>U of Michigan</sup>,  
Smead Naez <sup>U of Michigan</sup>, Amy Reines <sup>U of Michigan</sup>,  
Jessie Runnøe <sup>U of Michigan</sup>

**NO CONFERENCE FEE**  
Partial travel support is available for grad students and postdocs.

Details and registration at [conference.gmto.org](https://conference.gmto.org)

SPONSORED BY GMTO CORPORATION



AAS #241

Jan. 8-12, 2023, Seattle, WA

- Well attended GMT booth as part of US-ELT booth





# GMT as a part of the US-ELT Program

- Astro2020 Decadal Survey selects US-ELTP as top priority
- GMT submitted proposal for Preliminary Design Review conducted by the NSF
- PDR in progress
  - Session #1 Dec. 12-16, 2022
  - Session #2 Jan. 30 - Feb. 3, 2023

