



# Tenant Observatory Open House

Annual AURA Members Meeting

April 2024

*AURA Member Representatives Meeting • 22-24 April, 2024*



# Goals for Today

- **Open dialog** with the members about the tenant program
  - What is working
  - What is not working
  - How we can address the latter
- Provide some **background and context**
  - Scope of the program and current challenges



- Origin of the “tenant observatory” program
- Evolution following the 2014 Portfolio Review
- Cost sharing – how it works and what it means for users of the mountains
- Options for changing the cost sharing model
- Positioning ourselves for the 2030s



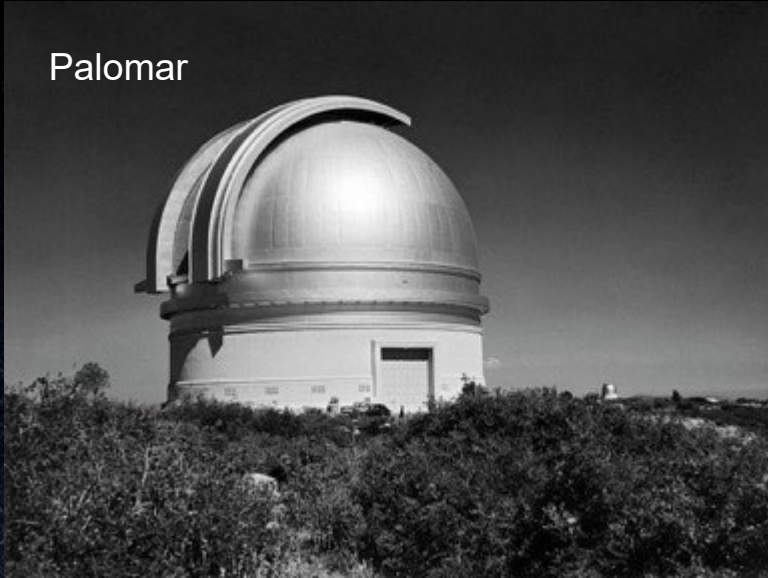
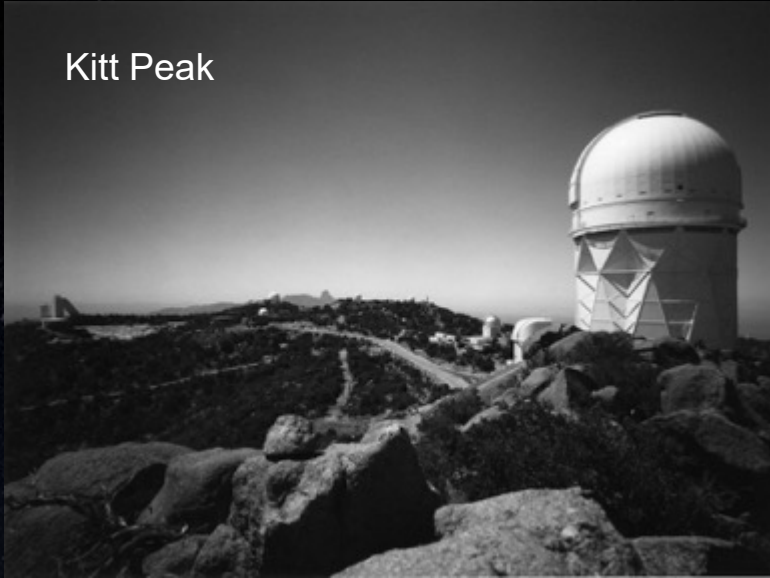
# US Observatories Circa 1975



Three 4m – 5m telescopes  
 Two 3m telescopes

Numerous 1m-2.5m telescopes

KPNO and CTIO were the *Open Access* observatories







# Origin of the Tenant Program



- When KPNO and CTIO were formed (1960s) they were...

## *THE NATIONAL OBSERVATORIES*

- Range of apertures/telescopes owned by NSF and operated by KPNO/CTIO for open access by US community
- KPNO/CTIO provided a base for other groups to build and operate telescopes (e.g. Steward Observatory Kitt Peak, MDM)
  - **Fixed costs** of mountain operations shared
  - **Services** provided by KPNO or CTIO
  - Enables university groups to **operate remote** observatories
- Other large US Observatories: Palomar, Lick and McDonald

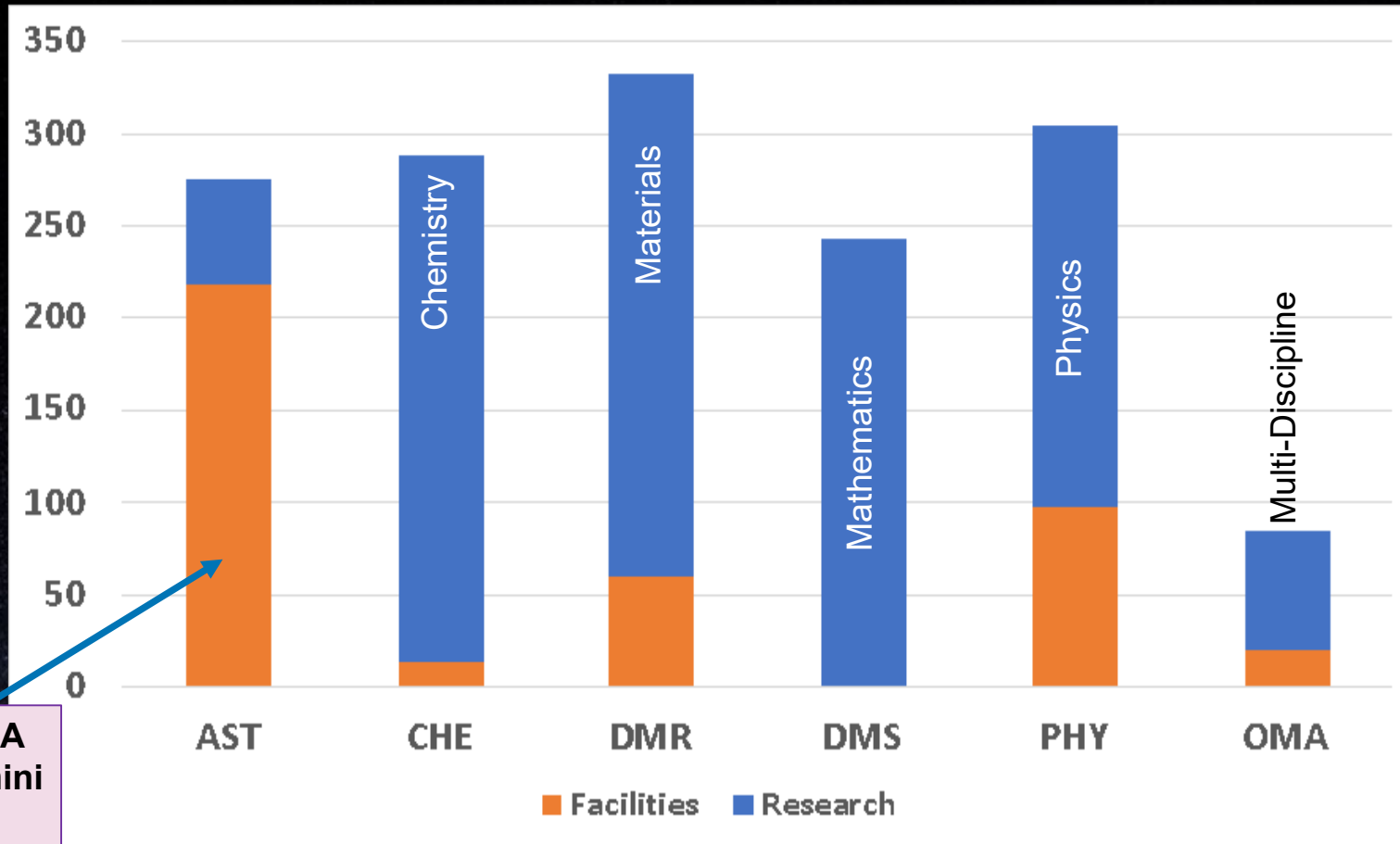
*The landscape has changed dramatically since then*



# National Science Foundation



## Math and Physical Sciences Directorate



AST budget has largest component of facility operations *by far*

FY20

- ALMA
- Gemini
- VLA
- DKIST
- Blanco
- ...





# 2012 Portfolio Review



2012 Portfolio Review lead to NSF divestment of NSF-owned facilities on Kitt Peak and CTIO (and others)

Mayall, WIYN, 2.1m, SOAR,...

Pressure on the AST budget has only increased since then

Advancing Astronomy  
in the Coming Decade:  
Opportunities and Challenges

Report of the National Science Foundation  
Division of Astronomical Sciences  
Portfolio Review Committee

August 14, 2012



**Portfolio Review  
reduced NSF  
costs by ~\$18M**

***Transferred  
those costs to  
others***



# Facility Futures-I

- Kitt Peak 2.1m open availability ended in FY 2014
  - Proposals to take over 2.1m under evaluation
- Mayall 4m leaves NOAO base budget after FY 2015
  - Continued operation for special projects funded outside NOAO base
  - Expect some community access continuing during 2016-2018 transition to DOE DESI project
- NOAO share in WIYN 3.5m telescope
  - Joint NASA/NSF exoplanet program is under development
  - Includes development of Extreme Precision Doppler Spectrograph under NASA solicitation





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## Facility Futures-2

- GBT and VLBA partitioned from NRAO management competition
  - Engineering and environmental baseline review taking place for both
  - Similar to NOAO Kitt Peak, these are outside NRAO base budget in competition, with any operations to be funded separately
  - Partnerships under development
- DKIST will supplant open-access NSO observatories
  - Partnership discussions for GONG, Sac Peak, McMath-Pierce
- Arecibo undergoing baseline review similar to GBT
  - Will lead to decision about status post-2016



# 2012 Portfolio Review



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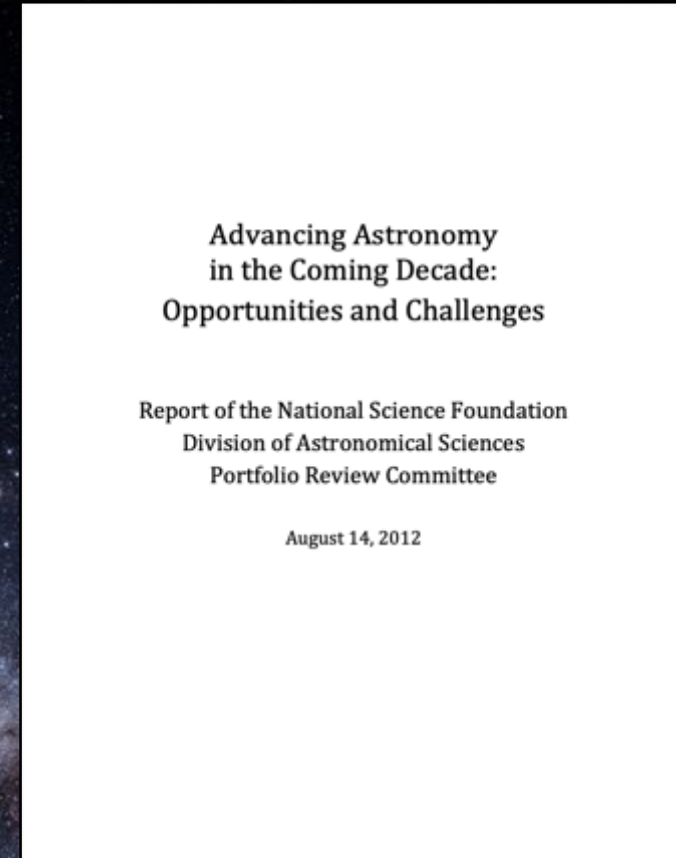
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## AURA's Approach

Build consortia of universities, laboratories, international organizations to operate the telescopes for their communities.

Enter into *Tenant Agreements* for operations





# The Tololo “Mushroom Farm”

## Small telescopes from US and International organizations











# The Tenant Program is Important!



- Outstanding **research** conducted by many institutions
- Important to faculty research and department **mission**
- Helps in the **training of students**
  - Research programs
  - Observing experience
  - Technical, hands-on experimental work





# What is going on at the tenants?



- Steward Observatory – Bok 2.5m telescope
- Space Watch – planetary defense, solar system studies
- Kitt Peak 2.1m / SEDM-KP - spectra of transients, LIGO follow-up
- Kitt Peak 0.9m – teaching, photometry (suspended)
- ARO – interstellar chemistry. Joined Event Horizon Telescope (EHT)
- MDM – Wide range of university research
- LCO-GT – World-wide Time Domain
- PROMPT – GRB characterization
- SMARTS – Time domain, synoptic, ePRV with Chiron (suspended)
- KMTNet – Microlensing by exoplanets
- Many other interesting projects...





# Challenges



- **America Competes Act**
  - Updated bi-annually
  - Restrictions on NSF
- **Regulatory environment** now much more restrictive than in the 1990s and early 2000s



ACA puts new requirements and costs on AURA and drives us towards “full cost recovery”





# Large Partnerships - Constraints!



- Mayall 4m – DOE/LBNL 100% use for DESI
  - Contract between LNBL and AURA
- WIYN 3.5m – Consortium of universities
  - 501(c)3 Corporation
  - NSF component is a separate award to AURA
  - NASA paid for NEID and supports NEID Operations
- SOAR
  - 501(c)3 Corporation
  - US Universities and Brazil
  - Funded through a subaward from NSF to AURA

***NOIRLab is legally prohibited from spending funds from its base award on these telescopes***





# Cost Sharing Methodology



- Shared mountain infrastructure and operations costs
  - Roads, power system, water system, physical plant....
  - Safety, security
- Metered and Per-Use Fee services
  - IT, utilities, commissary, dorms, support from staff
- NOIRLab support staff costs
- AURA Indirect Costs



# FY2025 Shared Cost Methodology



## **“NCOA Cost Model”** approach

- Center Operations Services (facilities, IT, safety) costs pooled
  - Allocated on basis of “base square footage” and “scientific square footage”
- Scientific Square Footage
  - Footprint of buildings used for science operations
  - **Minimum square footage** ensures that very small telescopes pay their way
  - Discount for **robotic facilities** (have lower cost impact)
- Provisional Indirect Rate computations impacted by tenant plans

***NOIRLab should develop a cost model for tenancy at CTIO and KP that provides transparency and stability for tenants at the same time as reducing risk to NOIRLab, if possible.  
– 2025 Program Review Panel Report***

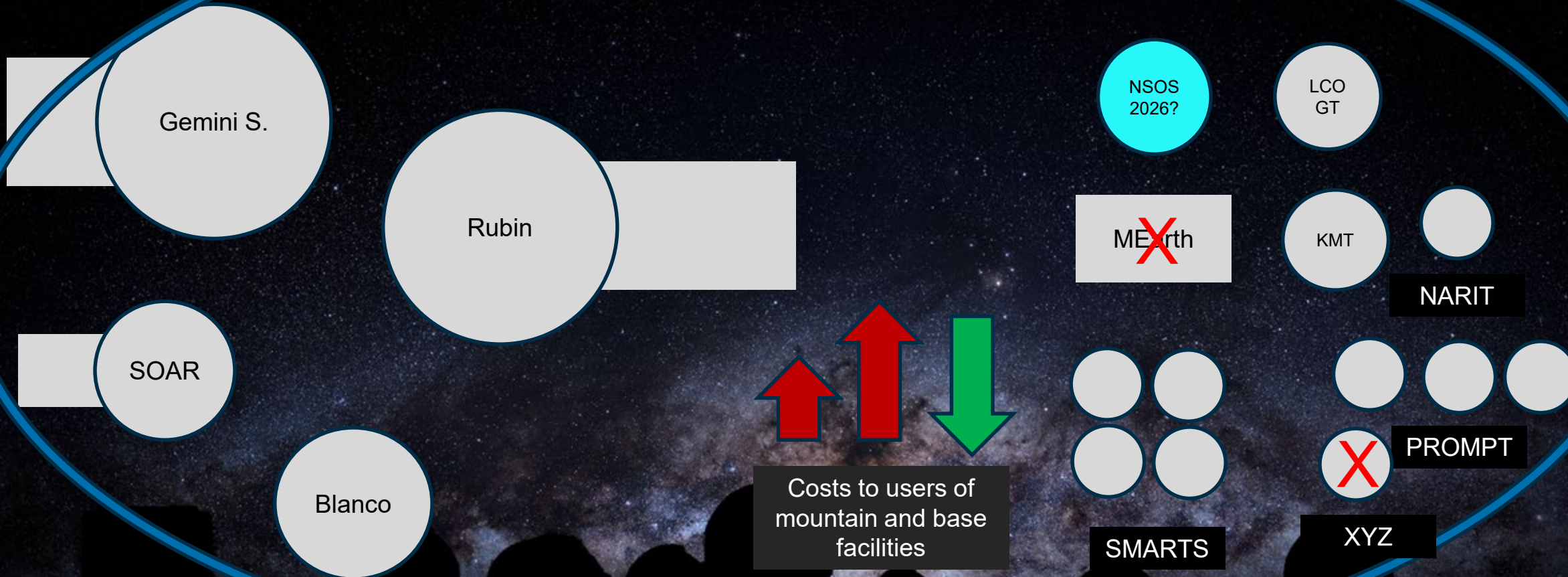




# Example - Chile Domes



## SHARED COST SQ. Ft. Rates





# FY2025 Shared Cost Methodology



## **"NCOA Cost Model" approach**

- **Shared costs allocated at start of fiscal year**
  - The status of tenant telescopes may change within a year, or year-to-year
    - Changes the cost to all users of the mountain sites
    - Rates reconciled after close of fiscal year (~18-24 months)
  - Can lead to **unexpected costs to tenants** – very difficult to accommodate
- **Linked nature of cost allocation**
  - Builds-in volatility and uncertainty for tenants
  - Makes NOIRLab budgeting and billing challenging
  - Rate calculations linked to actions from the tenants
  - Rate calculations are iterative and it is hard to reach convergence





# FY2025 Shared Cost Methodology



## *What we believe the university tenants desire*

- Predictable and stable costs that
  - Are well determined **prior** to the start of their fiscal year (July 1)
  - **Change little** from year to year
  - Are **based on their facility** – not linked to other tenants' actions

## *What NOIRLab management desires*

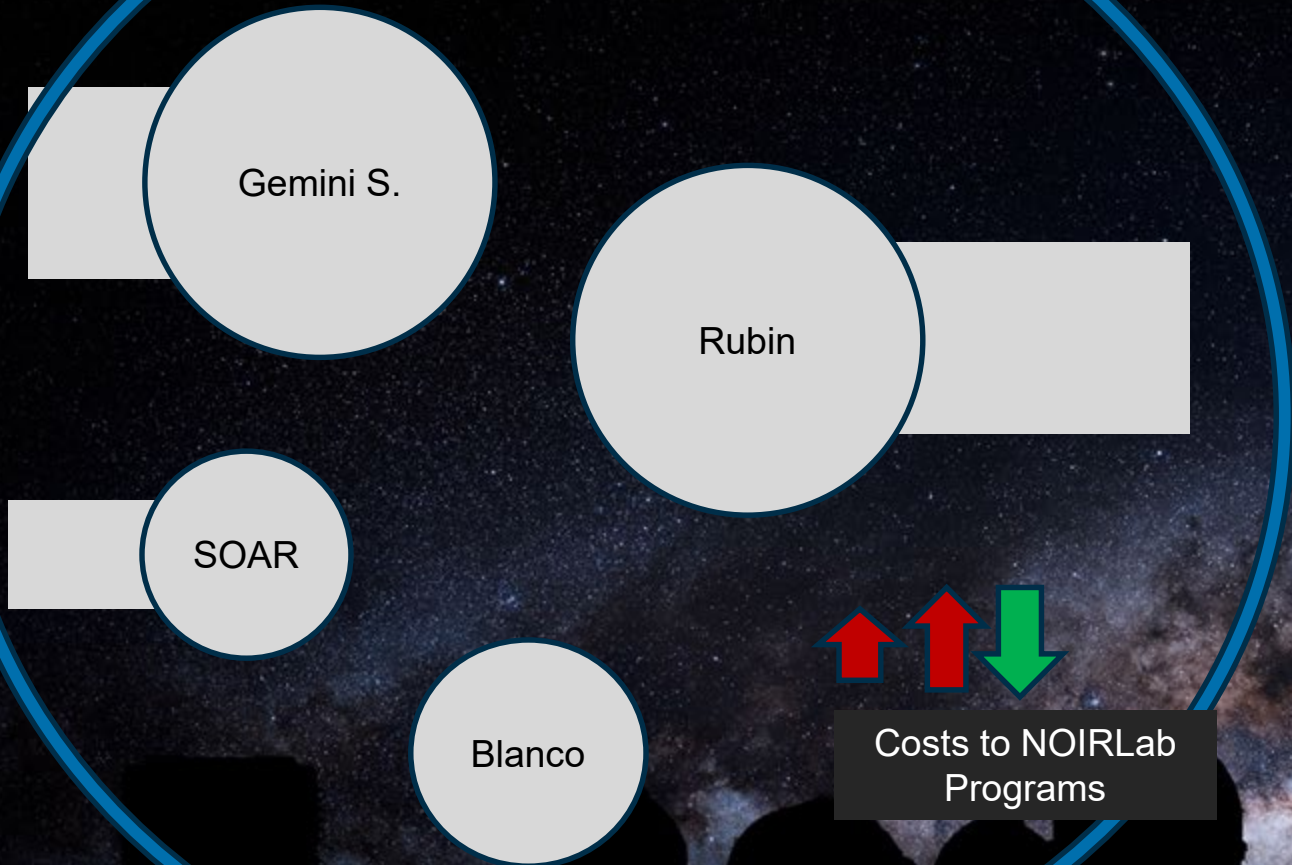
- Rates that can be **computed easily and early**
- Ability to **invoice tenants on time** with well determined costs
- **Tenants that are stable** – remain on site for long periods
- **Tenants that are successful!**



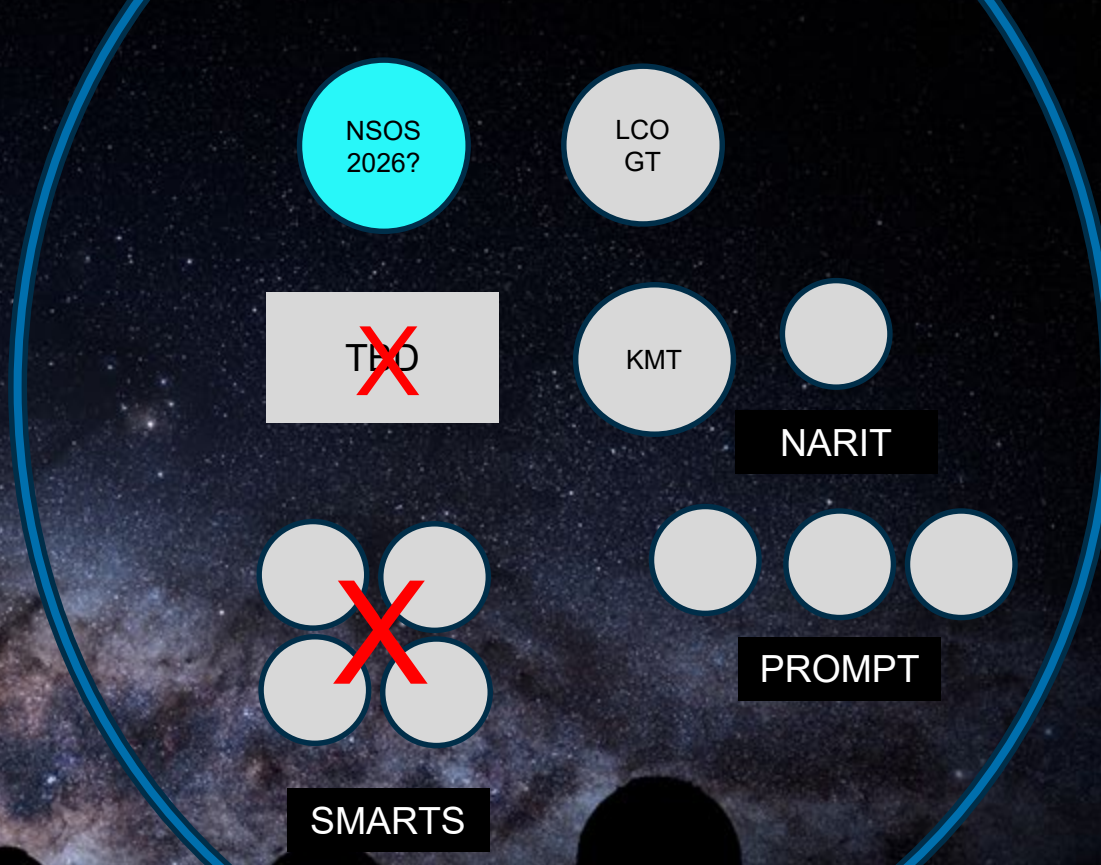
# Example - Chile Domes



## SHARED COST SQ. Ft. Rates



## Annual Flat Fees



Costs updated when agreements renew





# Challenges



- Many tenants are **struggling**
  - Costs have grown
  - Funding is difficult to secure
  - Costs are hard to predict
- We want to **help** tenants!
- **Our freedom to act is very limited**
- **Responding** to funding agencies' challenges
  - e.g., NASA reducing NN-EXPLORE support





# What do the Tenant Institutions Need?



We expect that the **tenants** want:

- Mountain infrastructure and support network
- Affordable and predictable operating costs
- Timely communication by NOIRLab and AURA

What **NSF and NOIRLab** need:

- Ability to respond to infrastructure needs at KP & CTIO
- Clear expectations for tenant, NASA and DOE funds
- Steady population of users on the mountains





# DISCUSSION TOPICS



## 1. What purposes do the tenant telescopes serve?

- To your institutions
- To education at undergraduate and graduate levels?

## 1. What do the tenant institutions need and want from NOIRLab?

- Technical support
- Mountain infrastructure
- IT, cyber security
- Cost stability
- Communications





# The Future of Small Telescopes



- The **cost of operating** observatories is growing
  - Inflation
  - Risk management (insurance, oversight, safety)
  - Compliance
  - Expectations for service
- **People** are main drivers of cost
  - Operations
  - Daily maintenance





# The Future of Small Telescopes



## A way forward?

- Reduce the personnel needs
  - On the summits
  - Overall
- Invest in automation
  - Remove people from the summit
- Invest in deferred and predictive maintenance
  - Most observatories cannot run more than a few nights without some type of failure
- Specialize!
  - Multiple modes, multiple instruments drive operating costs
- *Capital investments are easier to fund than on-going operations*



# NOIRLab Contacts



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