



# NSF AST Town Hall

## January 6, 2014

### Patricia Knezek & Jim Ulvestad



### Division of Astronomical Sciences (AST)

#### Office of the Division Director



James Ulvestad  
Division Director



Patricia Knezek  
Deputy Division  
Director



Elizabeth Pentecost  
Project  
Administrator



Donna O'Malley  
Operations  
Specialist



Vernon Pankonin  
Senior Advisor



Craig McClure  
Program Support  
Manager

#### Administration



Anton Jiggetts  
Program  
Specialist



Diana Phan  
Program  
Analyst



Matthew Via  
Program  
Assistant

#### Individual Investigator Programs, Astronomy & Astrophysics Research Grants



James Neff  
Stellar  
Astronomy &  
Astrophysics



Maria Womack  
Planetary &  
Extrasolar Planetary  
Astronomy



Daniel Evans  
Education &  
Special  
Programs  
(CAREER, REU,  
PAARE)



Andrew Clegg  
Enhancing  
Access to the  
Radio  
Spectrum  
(leaves 1/10)



Gary Schmidt  
Major  
Research  
Instrumentation



Joan Schmelz  
Astronomy &  
Astrophysics  
Postdoctoral  
Fellowship



Eric Bloemhof  
Advanced  
Technologies &  
Instrumentation



Richard Barvainis  
Extragalactic  
Astronomy &  
Cosmology



Edward Ahar  
Astronomy &  
Astrophysics  
Postdoctoral  
Fellowships  
(leaves 1/31)



Nigel Sharp  
Extragalactic  
Astronomy &  
Cosmology



Ilana Harris  
Stellar  
Astronomy &  
Astrophysics  
(on detail)

#### Facilities



Philip Puxley  
Atacama  
Large  
Millimeter  
Array  
01/06/2014



Glen Langston  
Electromagnetic  
Spectrum  
Management



Dana Lehr  
National  
Radio  
Astronomy  
Observatory



Craig Foltz  
National  
Solar  
Observatory



David Boboltz  
National  
Solar  
Observatory

Vernon Pankonin  
National Optical Astronomy  
Observatory

Eric Bloemhof  
Arecibo Observatory

Gary Schmidt  
Gemini Observatory

Andrew Clegg  
Electromagnetic  
Spectrum  
Management

#### Mid-Scale & Future MREFC Projects

Nigel Sharp  
NVO/VAO, Large Synoptic Survey Telescope

Vernon Pankonin  
Giant Segmented Mirror Telescope

Richard Barvainis  
Mid-Scale Innovations Program

Richard Barvainis  
University Radio Observatories

Craig Foltz  
Daniel K. Inouye Solar Telescope



# Outline

- AST Division: Staff Changes, Key Events since May 2013
- Science and Technical Highlights
- Status of Response to Decadal Survey
- Proposed Principles for Access to Data, Projects & Facilities
- The Budget
- Portfolio Review Status
- Astronomy and Astrophysics Research Grants (AAG)

# AST Scientific Staff Changes Since Jan. 2013

- Patricia Knezek: Deputy Division Director, Mar. 2013



- Dana Lehr: Program Officer, returned to role as NRAO Program Manager

- Jeff Pier: Program Officer, retired in Jan. 2013



- Vern Pankonin: Senior Advisor, now NOAO Program Manager



- Glen Langston: Program Officer, Feb. 2013, working on spectrum management and grants programs



- Ilana Harrus: Program Officer, Feb. 2013, on detail in the Office of International and Integrative Activities (OIIA) working on Major Research Instrumentation (MRI) program

# AST Scientific Staff Changes Since Jan. 2013



- Dave Boboltz: Program Officer, Mar. 2013, managing National Solar Observatory and TCAN grants program



- Andrew Clegg: Spectrum Management & EARS, leaving on Jan. 10



- Rotators finished: Katharina Lodders, Tom Statler



- Ed Ajhar concludes term at end of Jan. 2014, Dan Evans will take over as Individual Investigator Program lead



- New rotators: Jim Neff (Stellar Astronomy and Astrophysics) and Joan Schmelz (Astronomy and Astrophysics Postdoctoral Fellowships) arrived in Aug. and Sept., respectively



# Key AST Events Since May 2013

- June: Mid-Scale Innovations Program solicitation released  
NSF FY 2013 Operating Plan approved
- July: Dr. France Cordova named new NSF director  
(Confirmation still pending)
- July: NSF TCAN awards made
- August: ATST (now DKIST) rebaseline approved by NSB  
Dark Energy Survey began on Blanco Telescope
- August/Sept: ALMA Chilean employees strike/settled
- October: Federal government lapse in appropriations
- November: GPI first light
- December: LSST Final Design Review  
ATST renamed Daniel K. Inouye Solar Telescope

# The Telescope Formerly Known as ATST

DKIST renaming ceremony, Dec. 15, 2013



- Telescope renamed the Daniel K. Inouye Solar Telescope (DKIST)
- Operational status scheduled for mid-2019

DKIST Coude pier, Haleakala



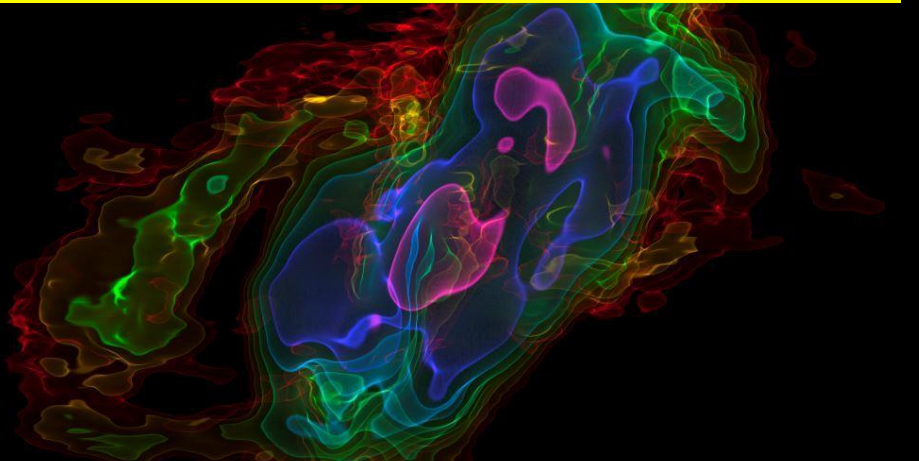
Coude rotator construction in Rockport, IL





# ALMA

NGC 253 position-velocity diagram, showing CO outflow in extensive wind from starburst region



- Last antenna accepted in 2013
- Now > 50 antennas at high site
- Almost 1400 proposals submitted by > 3400 international astronomers for Cycle 2
- Oversubscription rate > 10:1
- Final construction activities under way

*Bolatto et al., Nature, 499, 450 (2013)*

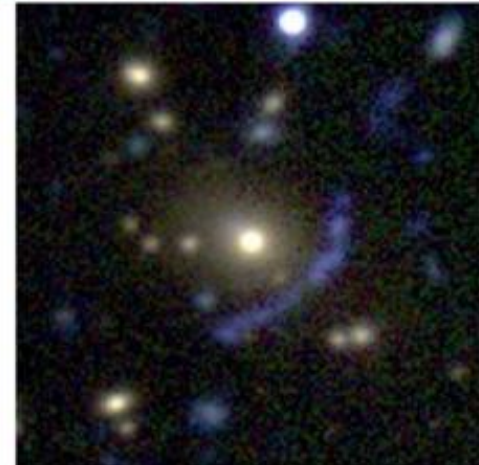
*Credit: Erik Rosolowsky, Univ. Alberta/ALMA (ESO/NAOJ/NRAO)*



# NSF CTIO/Blanco: Dark Energy Survey (DES)

- NSF/DOE collaboration, 5-yr survey, 525 nights
  - NSF supplies telescope, camera from DOE
- Survey began August 31, 2013, on CTIO 4m

Strong Lenses, from DES  
Science Verification



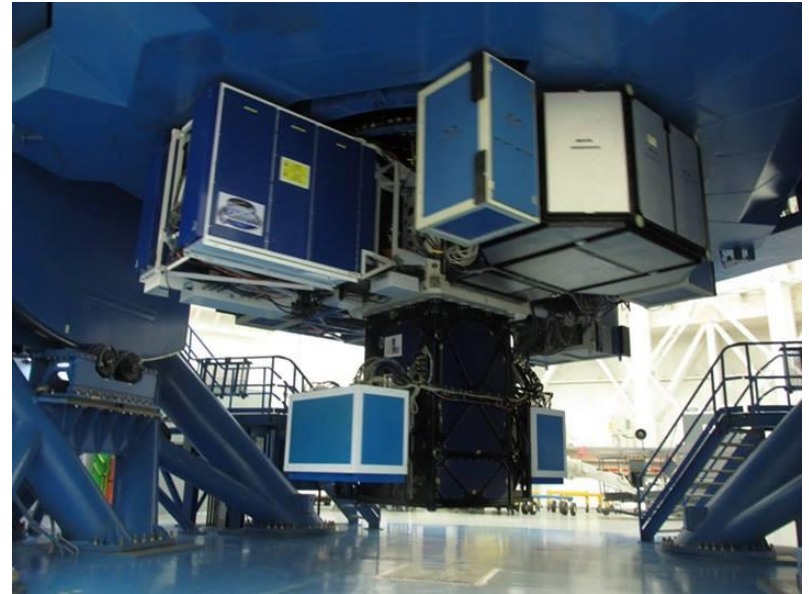
Credit: DES collaboration





# Gemini Planet Imager (GPI)

- GPI shipped to Chile, installed on Gemini-South in August
  - First light occurred on night of November 11/12
  - Public availability expected in 2014, Semester 2

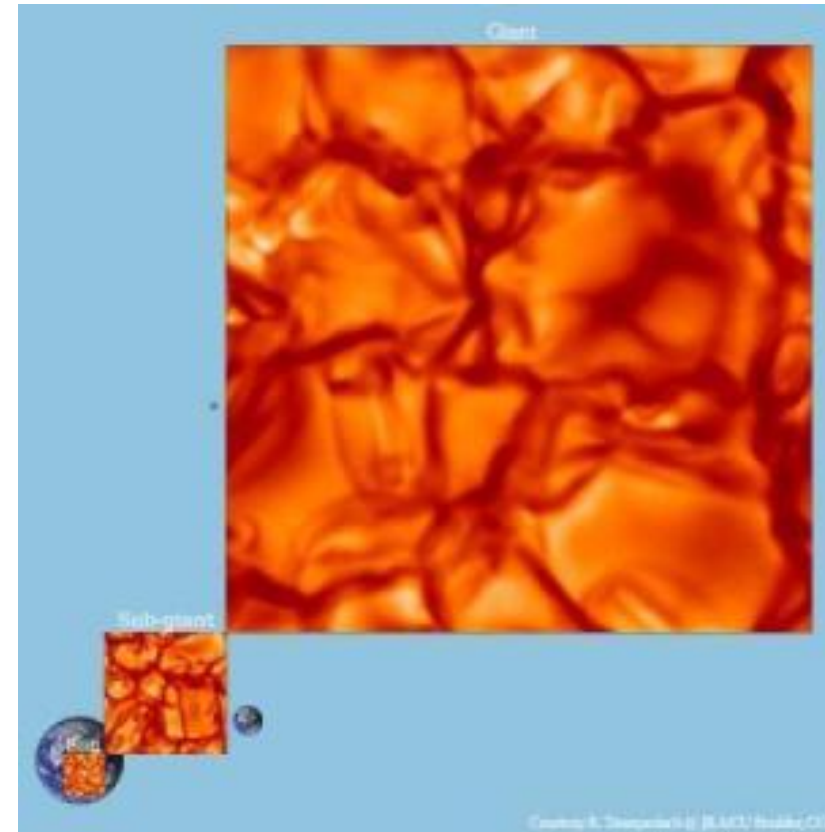




# New “Flicker Method to Measure Surface Gravity of Stars

- Measures short-term (<8 hours) brightness variations, or “flicker”
- High surface gravity = higher flicker frequency (finer granulation)
- Low surface gravity = lower frequency (coarser granulation)
- Simpler than photometry, spectroscopy, asteroseismology
- Combined with temperature measurements, will reduce uncertainties in stellar radii by factor of two
- Useful for testing stellar evolution models and deriving more accurate densities for hundreds of exoplanets
- Graduate student-led discovery (Fabienne Bastien, Vanderbilt)

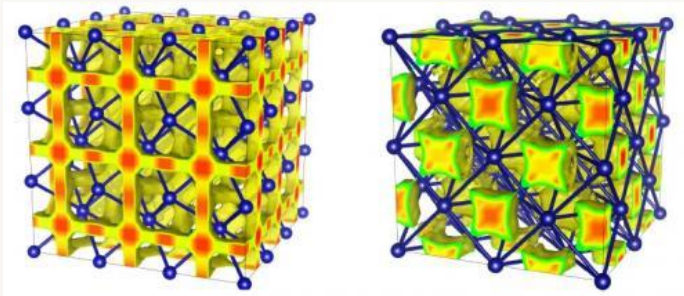
Nature, 2013, 500, 427. Bastien, Stassun, Basri, Pepper. AST-0849736, AST-1009810 (PI=Stassun)



*Simulations of granulation patterns on the surface of the Sun, sub-giant and giant stars are shown. The scale of each simulation is proportional to the size of the blue image of earth next to it. (Credit: Courtesy of R. Trampedach, JILA/CU Boulder, CO)*

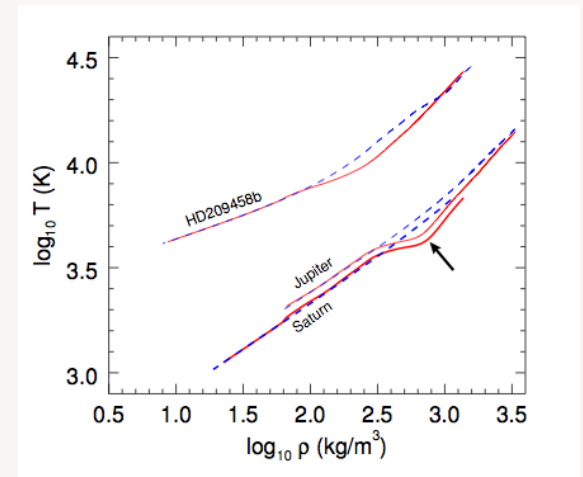


# Gas giant discoveries: New phase of water discovered and improved M-R relationships



Credit: Hugh F. Wilson, et al. ©2013 American Physical Society.

- Structure of super-ionic ice in (left) the bcc phase and (right) the newly discovered and more stable fcc phase. Super-ionic ice: O atoms fixed in lattice, H atoms migrate.
- *Ab initio* molecular dynamics simulations show that new phase of super-ionic water ‘ice’ could dominate interiors of Uranus and Neptune.
- Results imply Uranus and Neptune interiors are denser, and electronic conductivity is reduced. This may be relevant to modeling their unusual non-axisymmetric non-dipolar magnetic fields.



Temperature-density profile of three planets with region of new densities indicated by arrow.

- Improved H-He equation of state for giant planets lead to revised mass-radius relationship for giant exoplanets. Hottest exoplanets increase in radius by  $\sim 0.2 R_{\text{Jup}}$ . Change large enough to have implications for some discrepant “inflated giant exoplanets.”

Wilson, Wong & Militzer 2013, Phys Rev Lett., 110, 15, 1102; Militzer & Hubbard, 2013, Astrophys. J, 774, 148; Militzer 2013, Phys Rev B, 87, 14202 (AST-1008045, PI=Burkhard Militzer).



# Decadal Survey Status



# Decadal Survey (NWNH) Status

- LSST is in FY 2014 President's request, Final Design Review held in December
- MSIP is in FY 2014 President's request, solicitation was released, and pre-proposals are under evaluation
- NSF and community participating in TMT Board, Science Advisory Committee, via planning award
- Only Cerenkov Telescope Array (CTA) opportunity - MSIP
- Only CCAT opportunity - MSIP
- “Small” recommendations: TCAN (Theoretical and Computational Astrophysics Network) started with NASA, no funds available for other recommended increases



# LSST

- In President's MREFC budget request for FY 2014
  - Goal of starting NSF construction in July 2014
  - NSF Final Design Review held December 2-6
  - DOE camera construction not started in FY 2013 due to Continuing Resolution; in FY 2014 Budget Request



Good progress continues on Primary-Tertiary Mirror  
Secondary mirror contract in place: ITT/Exelis (design, option to build)





# Proposed Principles for Access to Astrophysics Data, Projects, and Facilities



# Background

- In 2013 report, Astronomy and Astrophysics Advisory Committee (AAAC) recommended agency consideration of principles for access to astrophysics data, projects, and facilities
  - Motivated partly by upcoming LSST construction, Euclid, WFIRST, and desire to optimize opportunities for US community
  - Office of Science & Technology Policy, NSF AST, NASA Astrophysics, and DOE HEP met throughout the summer to develop proposed principles
- Agencies presented suggested principles to AAAC in November 2013; AAAC is now working on its own formal recommendation to agencies





# Intent of Agencies

- From NASA Astrophysics Division, NSF Division of Astronomical Sciences, DOE Office of High Energy Physics
  - Apply principles to all large astrophysics projects and facilities funded by these organizations
  - Apply principles to international collaborations, interagency collaborations, and partnerships with other public and private entities
  - Assess all proposed large astrophysics projects and facilities against these principles before deciding to undertake them
  - Discuss these principles with our partners in current and future large astrophysics partnerships and facilities
- If agencies deviate significantly from these principles, reason for deviation should be articulated explicitly



# Five Proposed Principles

- Global Coordination to Optimize Use of Constrained Resources
  - Use resources effectively, efficiently, and without unnecessary duplication
- Open Data
  - Accessibility of data in a scientifically useful form; may include period of limited access
- Open Access
  - Merit-based process, with opportunity for some preferred access to contributors
- Opportunity to Contribute
  - Openly advertised criteria for collaboration membership
- Reciprocity
  - Those desiring access to resources should offer similar access to their own resources



# The Budget



# Impacts of Lapse in Appropriations

- LSST Final Design Review postponed from October to December
- NRAO-North America shut down because of lack of FY 2014 funds, several other facilities were close to depleting FY 2013 funds
- Mid-Scale Innovations Program schedule was delayed approximately one month
  - Invitation letters in January, full proposals due in March 2014



# NSF Budget History, 2007-2014

Year	Pres. Req. for NSF	NSF Approp	Pres. Req. for AST	AST Approp
2007	\$6020	\$5884	\$215.1	\$215.4
2008	\$6429	\$6084	\$233.0	\$217.9
2009 ARRA	\$6854	\$6469 + \$2402	\$250.0	\$228.7 + \$85.8
2010	\$7045	\$6972	\$250.8	\$246.5
2011	\$7424	\$6913	\$251.8	\$236.8
2012	\$7767	\$7105	\$249.1	\$234.7
2013	\$7373	\$6884	\$244.6	\$232.5
2014	\$7626	???	\$243.6	???

- NSF and AST received regular appropriations close to the request only in 2007 and 2010
- After 2010, appropriations flattened/decreased



# FY 2013 Budget for Mathematical and Physical Sciences Directorate

**\$1250M (-4.5%)**

*Assistant Director for Mathematical and Physical Sciences*

**\$233M  
(-0.9%)**

**\$229M  
(-2.1%)**

**\$291M  
(-1.3%)**

**\$220M  
(-7.8%)**

**\$251M  
(-9.6%)**

*Division of  
Astronomical  
Sciences*

*Division of  
Chemistry*

*Division of  
Materials  
Research*

*Division of  
Mathematical  
Sciences*

*Division of  
Physics*

*Office of Multidisciplinary Activities*

**\$27M  
(-9.9%)**



# AST Budget, FY 2013=\$232.55M

Program	\$M	Program	\$M
Nat. Fac.	132.57	AAPF	2.19
AAG	42.44	Spec. Proj.	2.12
URO	10.76*	REU	2.00
ATI	8.66	PAARE	0.91
LSST D&D	7.50	Education	0.50
Mid-scale	7.34	GSMT (TMT)	0.25
EARS	6.00*	Expenses	3.74
CAREER	4.59	Misc.	0.98

- \*URO included \$4.5M in FY14 forward funding
- \*EARS funding of \$6.0M was added to AST budget



# FY14/FY15 Budgets

- Good news in President's FY 2014 Request
  - Strong support of NSF overall
  - LSST funding is requested in MREFC line
  - Mid-Scale Innovations Program start
- House and Senate committees used different funding assumptions for FY 2014, and thus produced different budgets for NSF
  - Budget “agreement” has not resulted in an NSF budget number or an appropriation
  - FY 2014 outcome remains in doubt
- President's FY 2015 request is in preparation

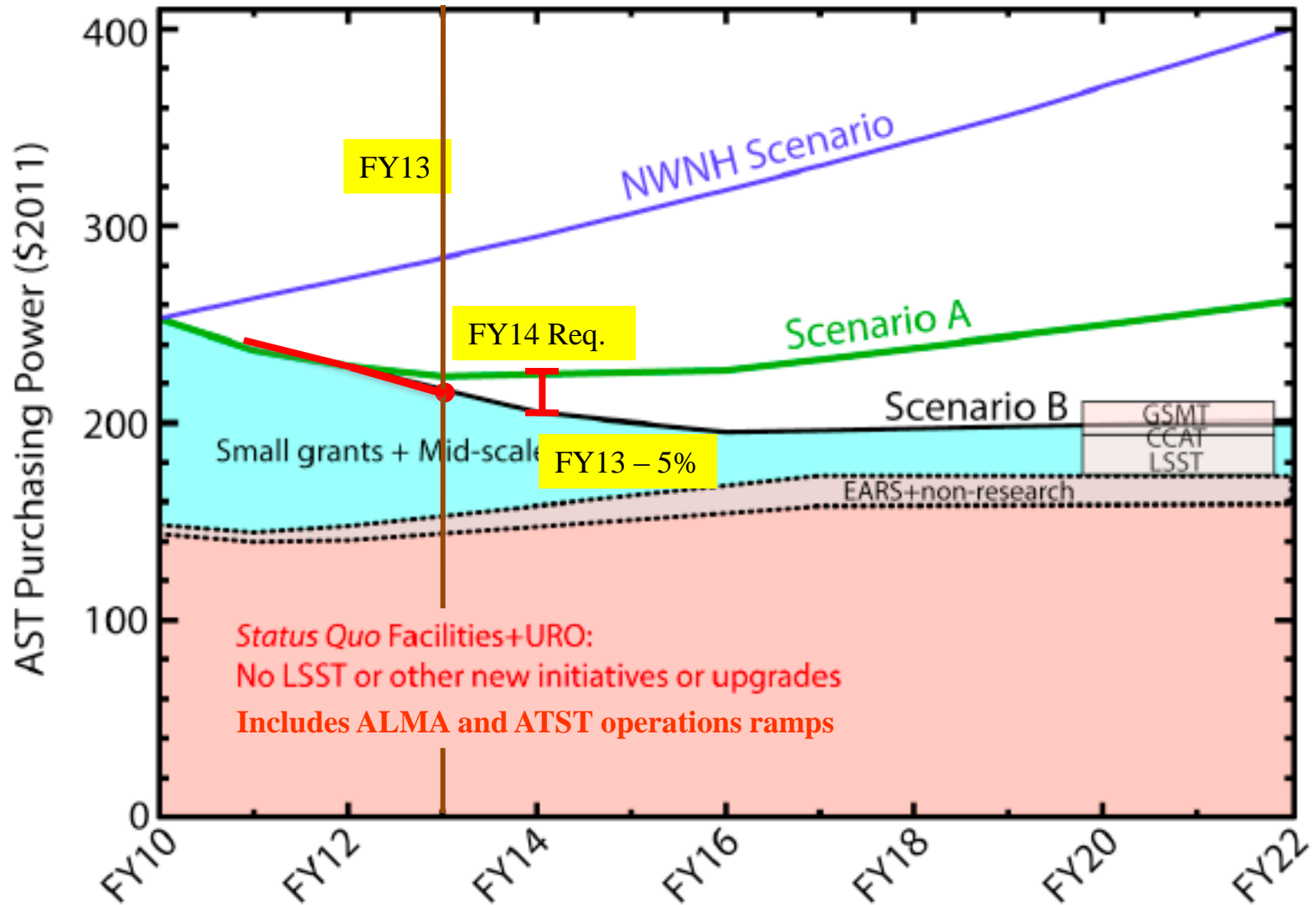




# Portfolio Review



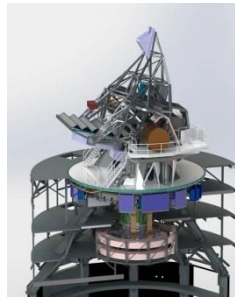
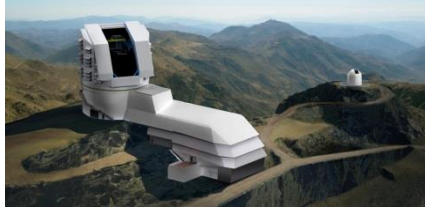
# Portfolio Review Budget Scenarios





# AST Strategy to 2020 and Beyond

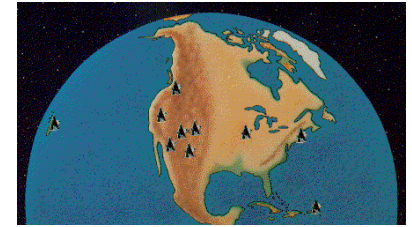
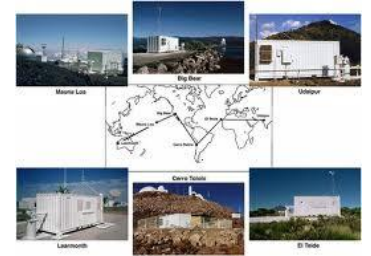
## Major Facilities



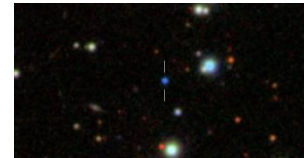
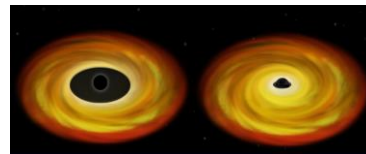
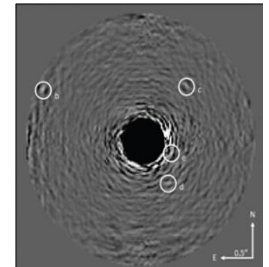
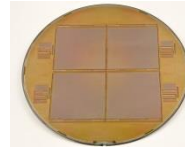
## Mid-Scale Innovations



## Divestment/ Partnership



## Individual Investigators





# Portfolio Review Status

- AST issued Dear Colleague Letter NSF 14-022 on December 20, 2013
  - Lays out future steps for all telescopes that were either recommended for divestment in the near term or for future consideration
  - NSF will begin formal consideration of alternatives for a number of telescopes, while consideration of some others awaits specific external milestones
  
- FY14 and FY15 budget outcomes could constrain options



# Astronomy and Astrophysics Research Grants (AAG)

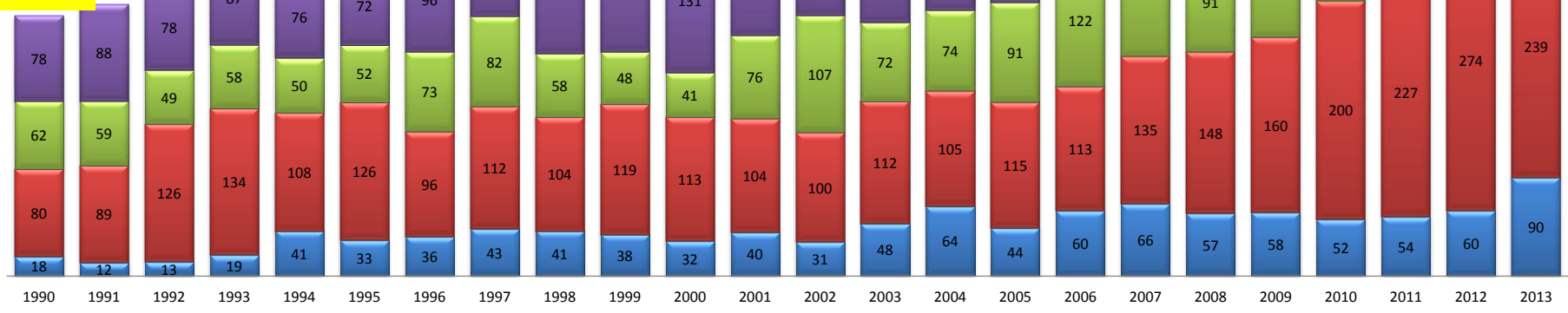


758

# Proposals Reviewed in AAG

- PLA
- SAA
- GAL
- EXC

238

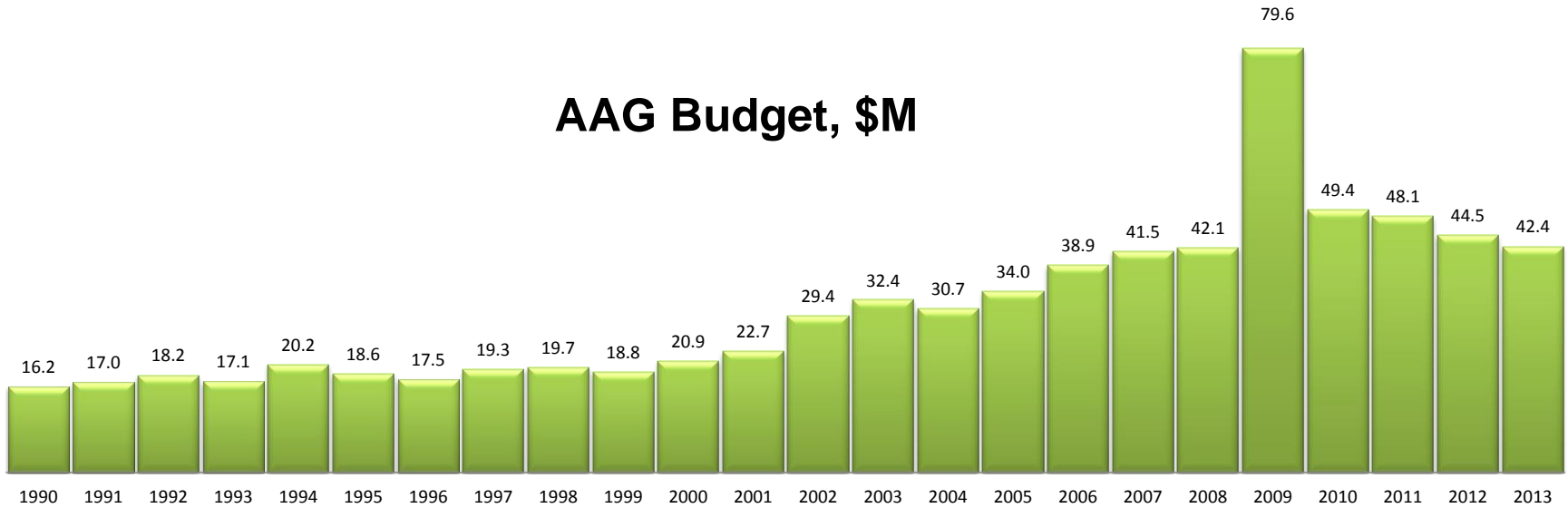


1990

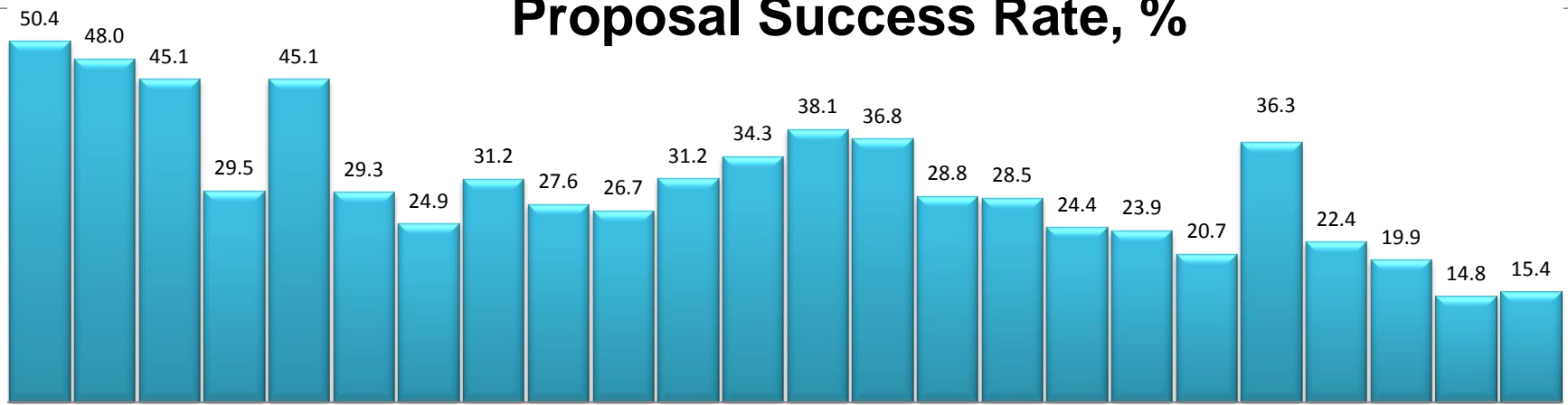
2013



## AAG Budget, \$M



## Proposal Success Rate, %



1990

2013



# AAG Now and Future

- FY13: 112/758 proposals = 15% funding rate
  - Desire >20% funding rate for best merit review
- Number of FY14 proposals  $\approx$  FY13 proposals
- AAG is the only large capacitor to absorb shortfalls
  - Under consideration: reducing frequency of AAG calls, restricting numbers of proposals per investigator/institution
  - Need to reduce facility load to retain AAG funding





# Town Halls and Other Sessions

- AAPF Symposium; Saturday/Sunday
- 141: Dark Energy Camera & DES; Monday, 2 p.m.
- Proposing for NRAO instruments; Tuesday 12:30 p.m.
- 221: TMT Town Hall; Tuesday, 12:45 p.m.
- 242: NRAO Town Hall; Tuesday, 6:30 p.m.
- Gemini Open House; Tuesday, 6:30 p.m.
- 304: Demographic Studies and AAS; Wednesday, 10 a.m.
- 317: Time Domain, LSST, Transients; Wednesday, 10 a.m.
- 320: CAA Town Hall; Wednesday, 12:45 p.m.
- Policy, F. Fleming Crim, NSF MPS AD; Wednesday, 3:40 p.m.
- 342: ESO Present and Future; Wednesday, 7 p.m.
- 419: GMT Town Hall; Thursday, 12:45 p.m.
- 420: Transforming NOAO; Thursday, 12:45 p.m.