NSF Division of Astronomical Sciences (AST): AAAC

Ralph Gaume

Deputy Division Director

September 27, 2017

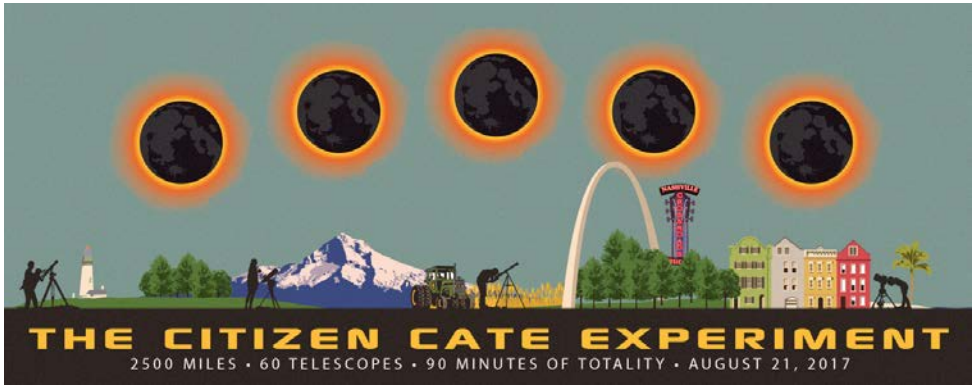
NSF, MPS, Big Ideas

- Jim Ulvestad, Acting Assistant Director, Directorate for Mathematical and Physical Sciences
- Presentation, Questions

Talk Outline

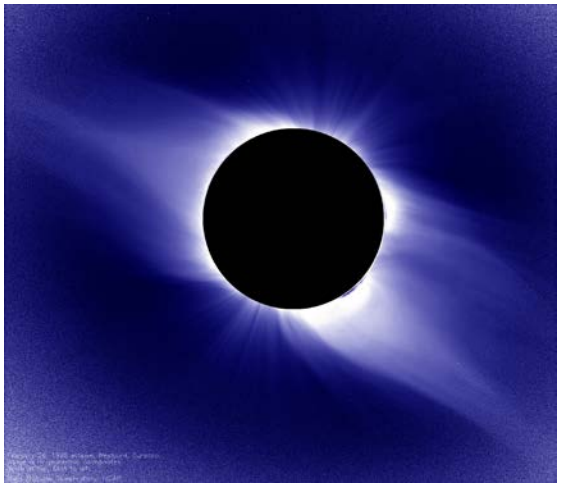
- Highlights
- The Move
- AST Personnel
- AST Grant Program
- AST Facilities
  - Including Divestment
- AST Budget (FY 2018)

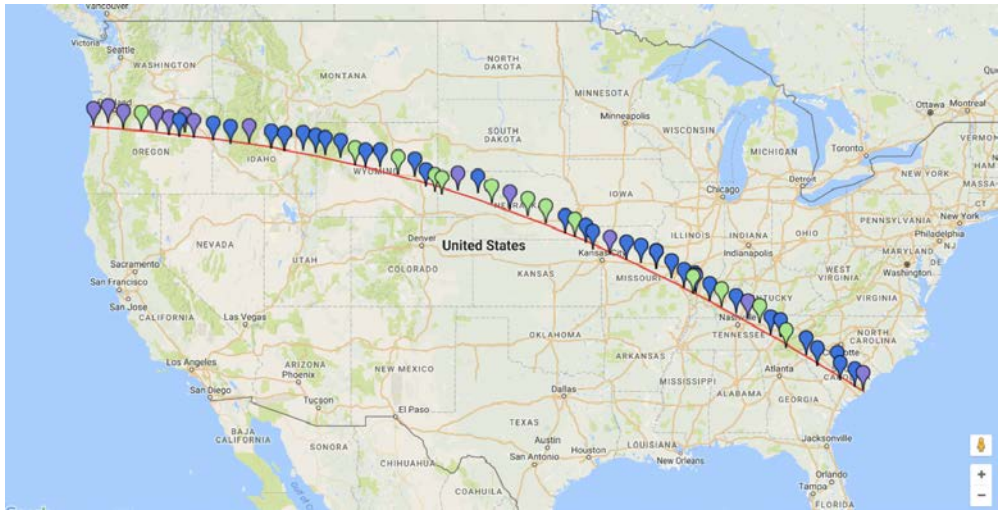
Some Highlights

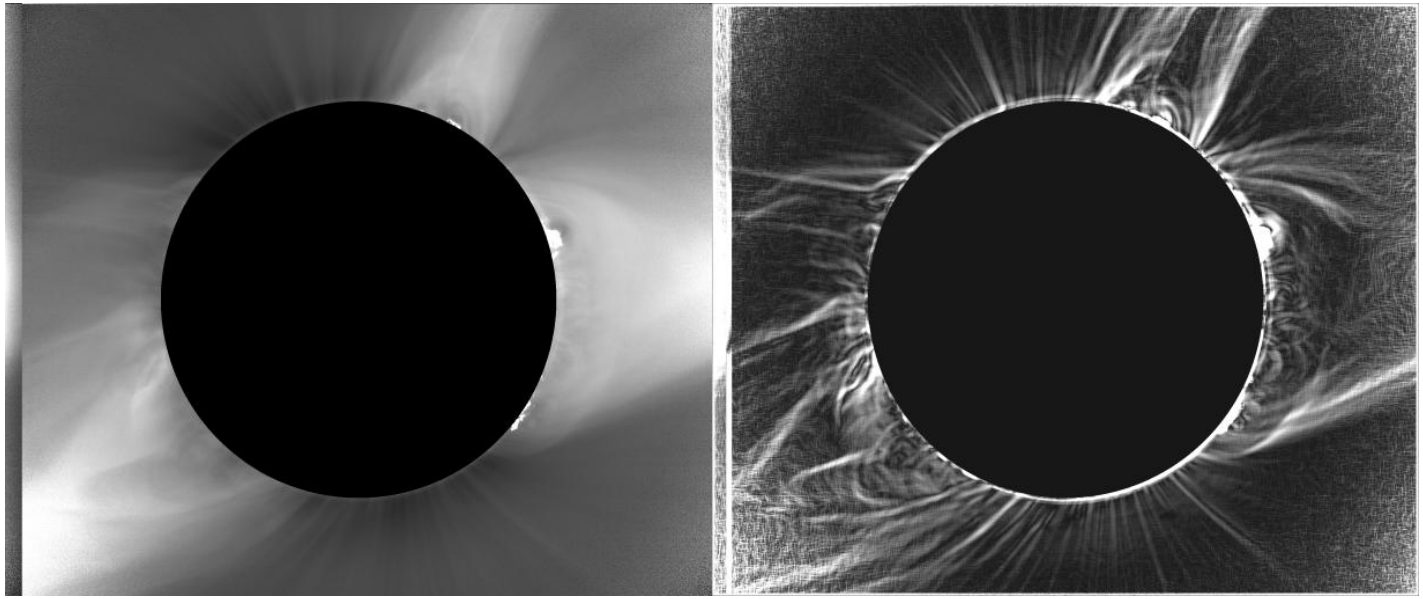


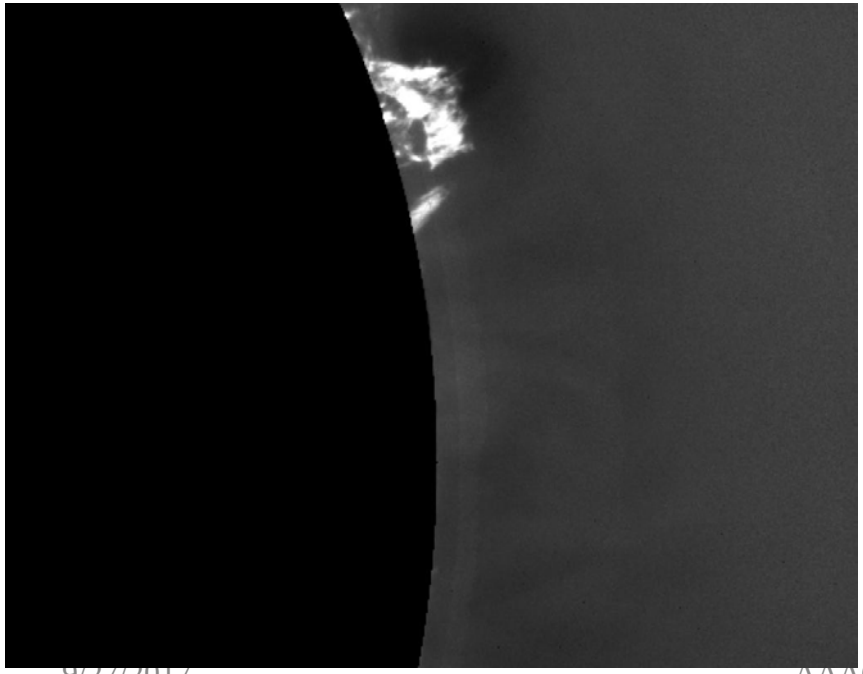
Continental-America Telescope Eclipse (CATE)

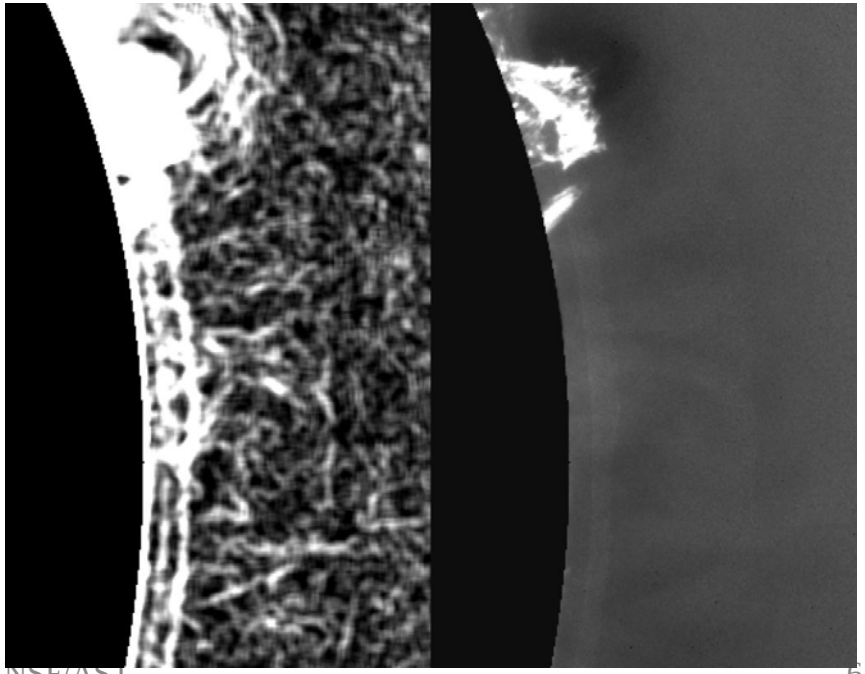
- Led by Matt Penn of NSF's National Solar Observatory
- 68 identical telescope sites along the path of totality manned by citizen scientists
- Images every 10 seconds with 2 arcsecond resolution
- 90+ minutes of eclipse data (coronal movie)



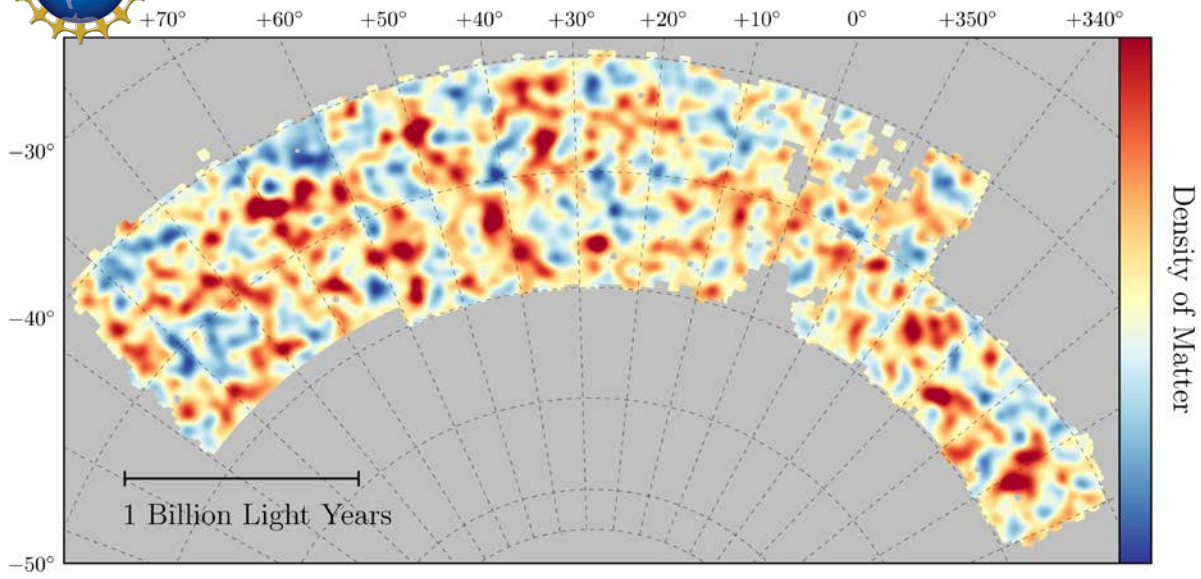








Dark Energy Survey Determines Cosmological Parameters

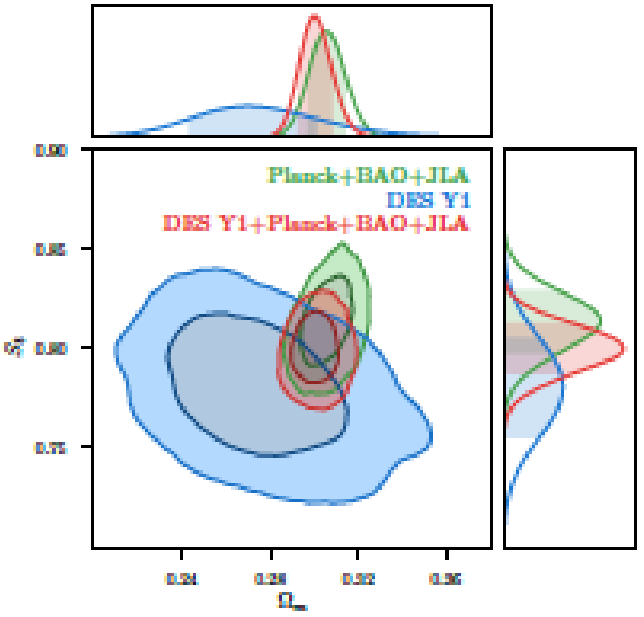


Credit: C. Chang et al,, arxiv:1708.01535 (2017)

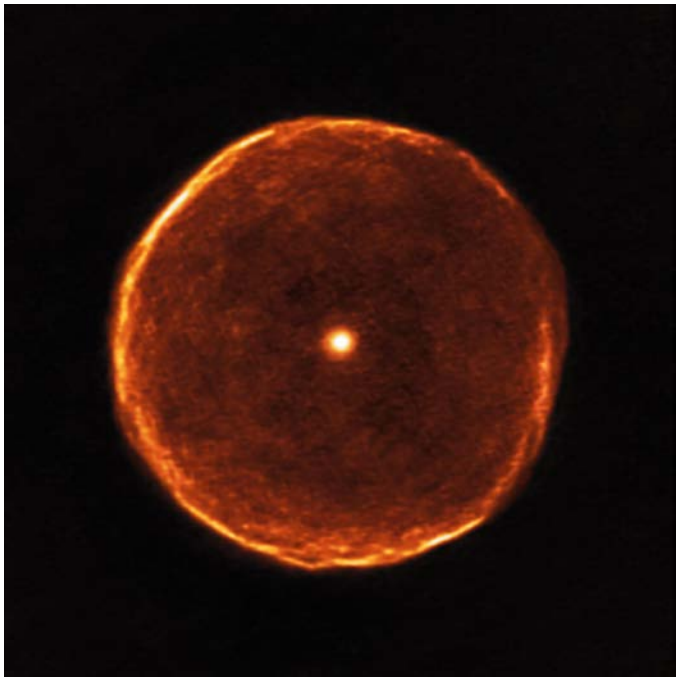
The DES collaboration analyzed the first year of imaging data from the Dark Energy Camera on the NOAO Blanco 4m telescope. Those determinations alone are comparable in accuracy to those of the Planck mission.

Credit: Dark Energy Collaboration, arxiv 1708.01530 (2017)

- Utilized weak lensing distortion of 26 million source galaxies in four redshift bins (mass map above), and the angular correlation of 650,000 luminous red galaxies for the analysis.
- Combined with other cosmological measures, they derive values for the density of dark energy and dark matter with ~1% uncertainty, and the equation of state to ~4%.
- The investigation is supported jointly by NSF and DOE.



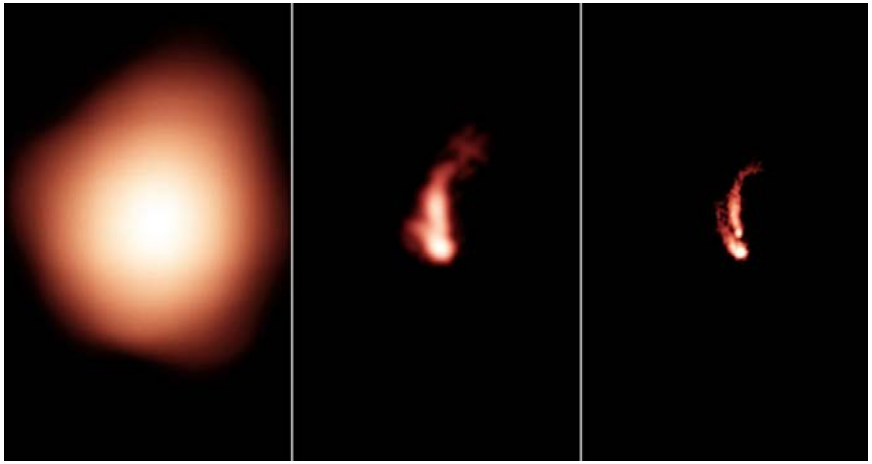
Two highlights: ALMA and VLA



Kerschbaum et al. A&A Aug 10, 2017

ALMA: Outflows from AGB stars - Thermal CO spectral line data cube of U Antlia. Suggests a high mass outflow rate (10^{-5} solar masses/yr) about 2700 years ago of ~100 years duration.

VLA: Has begun new sky survey (VLASS), anticipated to detect 10M objects, 4x currently known. Will require ~5500 hrs of observing time. NVSS, FIRST, & VLASS images →



Credit: Bill Saxton, NRAO/AUI/NSF

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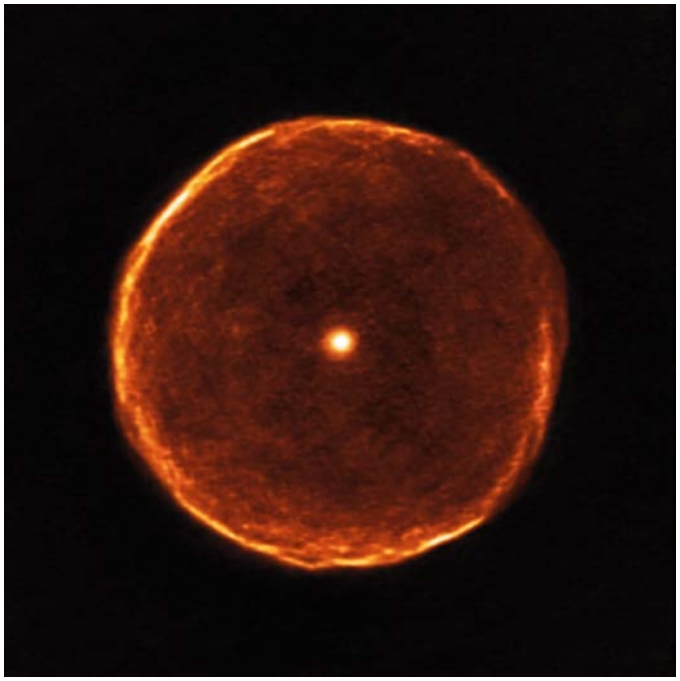

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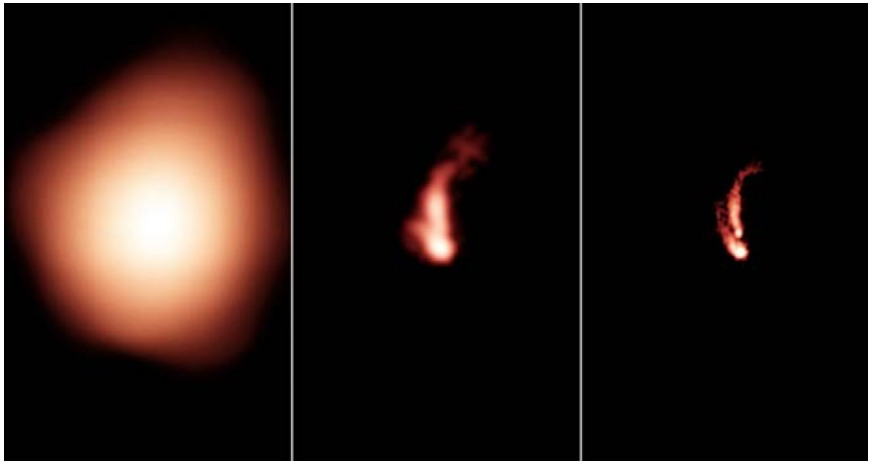
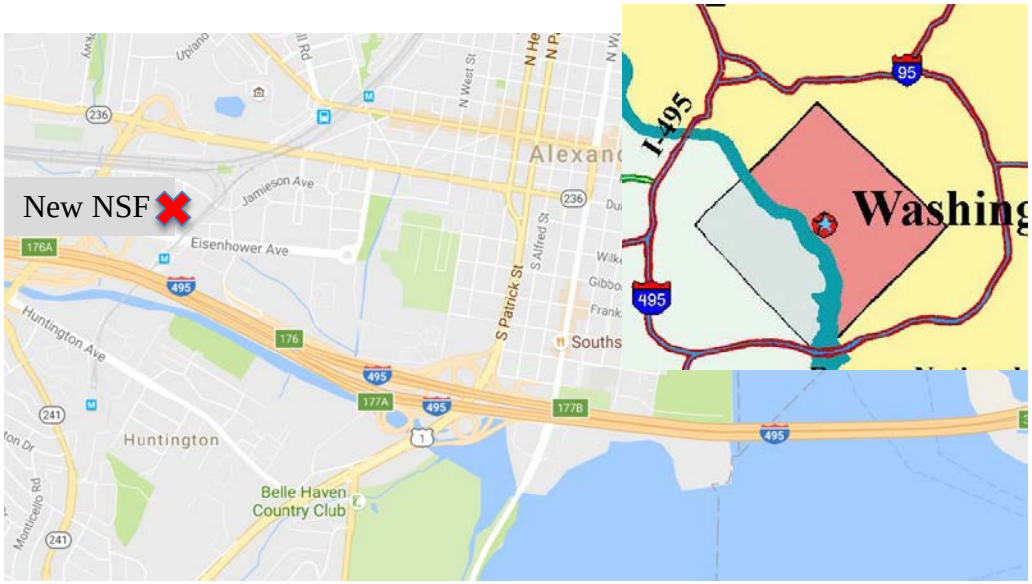


Credit: Bill Saxton, NRAO/AUI/NSF

The Move

The Move

- NSF is 5/6 moved from Arlington, Virginia Alexandria, Virginia
  - BFA, OIG, OIRM (partial) Aug 28
  - GEO, MPS, OIRM (partial) Sept 05
  - CISE, HER, OIRM (partial) Sept 11
  - BIO, OIRM (partial) Sept 18
  - ENG, ODI, OIA, OISE Sept 25
  - NSB, OD, OGC, OLPA, OIRM, SBE Oct 02
- RG personal opinion: move went much better than I anticipated



AST Personnel

Division of Astronomical Sciences (AST)

Office of the Division Director

Richard Green
Division Director

Ralph Gaume
Deputy Division Director

Craig McClure
Program Support Manager

Donna O'Malley
Financial & Operations Specialist

Vernon Pankonin
Senior Advisor

Elizabeth Pentecost
Project Administrator

Administration

Allison Farrow
Program Specialist

Stephanie Hill
Program Assistant (Student)

Diana Phan
Program Analyst

Matthew Viau
Program Specialist

Individual Investigator Programs and Astronomy & Astrophysics Research Grants

James Neff
Program Director
IIP Coordinator; Education & Special Programs (REU, PAARE)

Richard Barvainis
Program Director
Extragalactic Astronomy & Cosmology

Glen Langston
Program Director
Galactic Astronomy

Harshal Gupta
Program Director
Astronomy & Astrophysics Postdoctoral Fellowships

Faith Vilas
Program Director
Solar and Planetary Research Grants

Hans Krimm
Program Director
Stellar Astronomy & Astrophysics

Peter Kurczynski
Program Director
Advanced Technologies & Instrumentation, Major Research Instrumentation

Linda French
Program Director
Stellar Astronomy & Astrophysics

Kenneth Johnston
Expert

Matthew Benacquista
Program Director

Facilities, Mid-Scale, & MREFC Projects

Christopher Davis
Program Director
Gemini Observatory

Philip Puxley
Program Director
National Radio Astronomy Observatory

David Boboltz
Program Director
National Solar Observatory

Nigel Sharp
Program Director
Large Synoptic Survey Telescope

Edward Ajhar
Program Director
Green Bank Observatory, Long Baseline Observatory

Joe Pesce
Program Director
Arecibo Observatory

Vernon Pankonin
National Optical Astronomy Observatory

Richard Barvainis
Mid-Scale Innovations Program

Philip Puxley
Atacama Large Millimeter Array

ESM

Thomas Wilson
Program Director

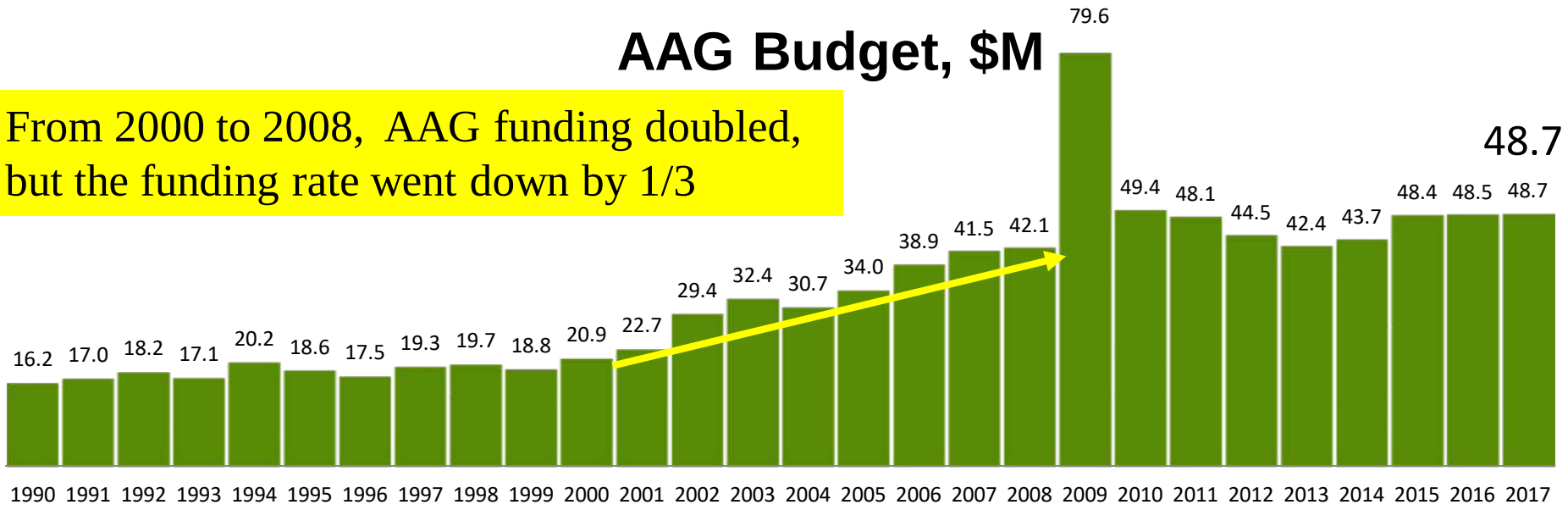
Bevin (Ashley) Zauderer
Program Director

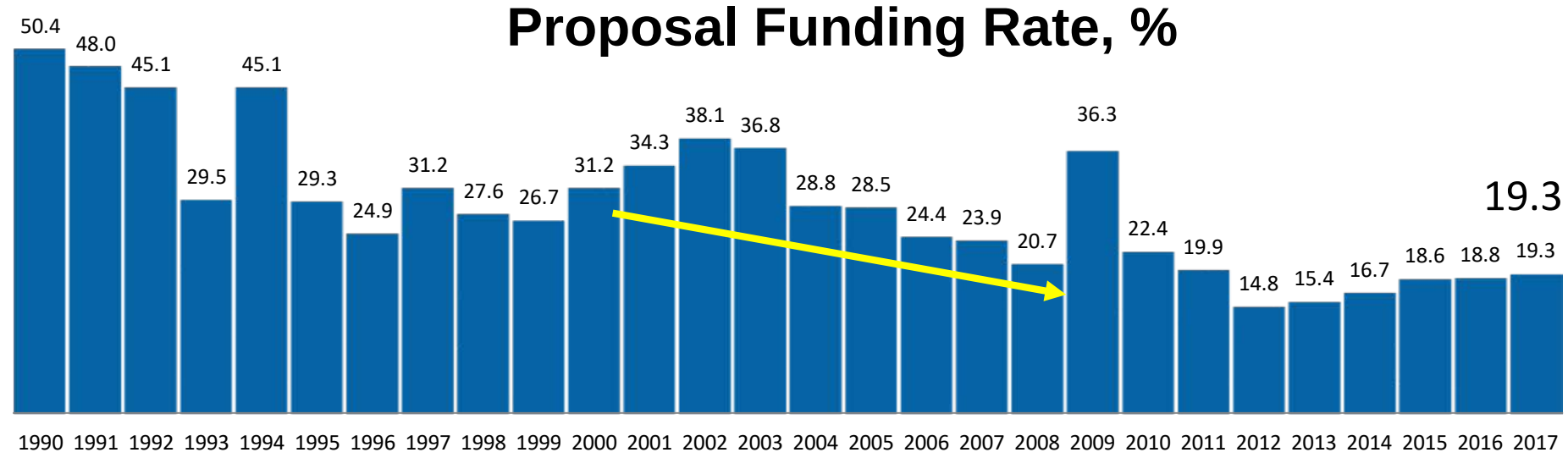
Jonathan Williams
Program Director

AST Grants Program

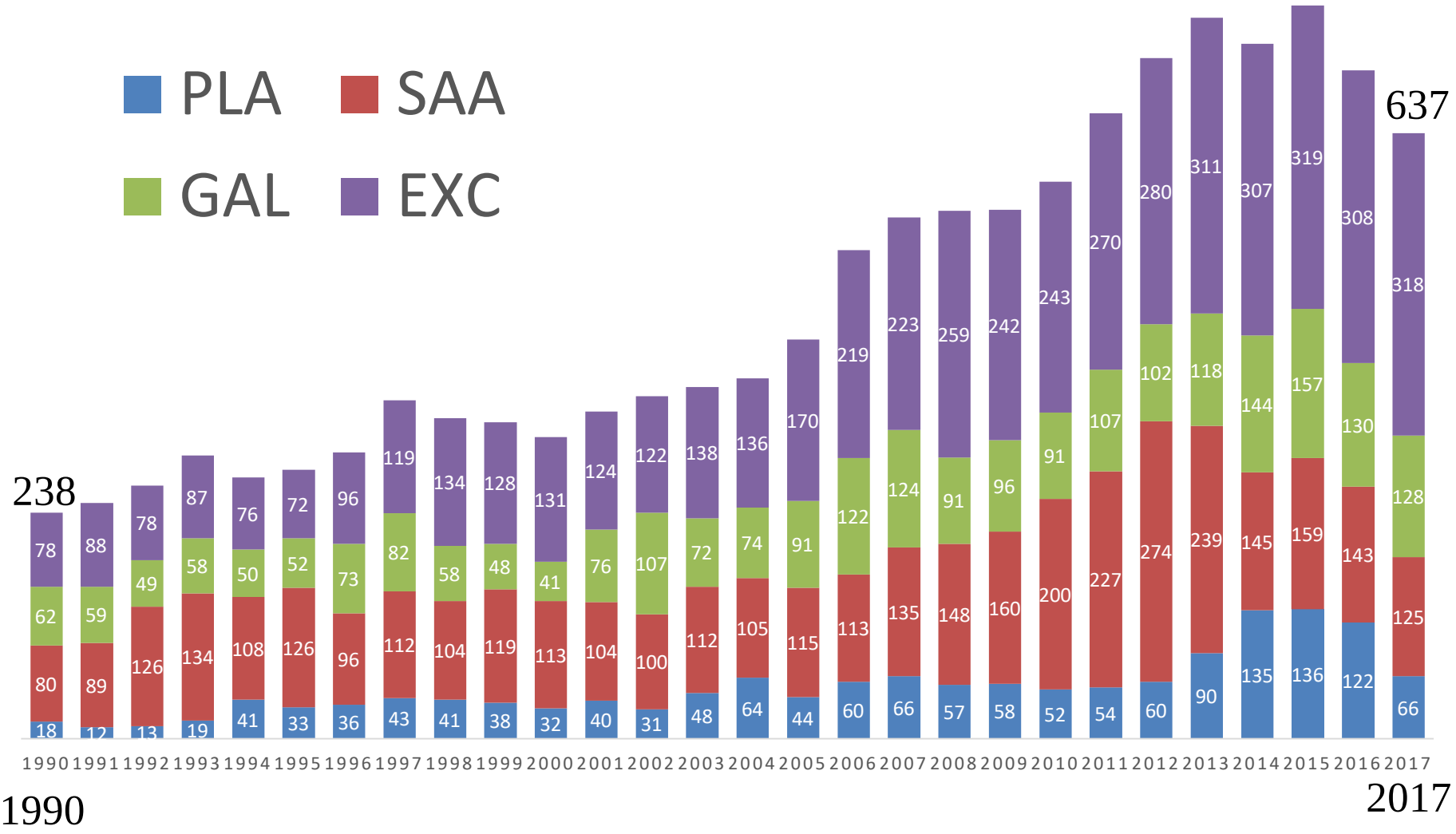
AAG Funding History, 1990-2017

From 2000 to 2008, AAG funding doubled, but the funding rate went down by 1/3





Proposals in AAG, 1990-2017



IIP Update

- *No Proposal Deadline* pilot underway for the Planetary/Exoplanetary and Solar portions of AAG
  - Purposes: Understand and resolve issues with proposal handling and merit review; alleviate impact of life events for proposers; investigate impact on proposal load over the year; enable proposal file updates for minor errors.
  - Pilot will continue in FY2018. Too soon to draw conclusions, but… solar proposals up, planet/exoplanet proposals down
- MSIP solicitation has been released for FY2018.
- ATI deadline postponed. Program review in progress.
- PAARE deadline postponed. Program review in progress
- New MRI solicitation expected for FY2018

AST Facilities

Daniel K. Inouye Solar Telescope (DKIST)

- DKIST will be a 4.2-meter solar telescope to study the Sun at the fundamental 20-km scale of the solar magnetic structures.
- Completion in FY 2020 at Haleakala Observatory (Maui).
- Hawaii Supreme Court affirmed construction permit (Oct. 6)
- Top: Artist's view of DKIST enclosure with cutaway
- Bottom: Base ring of Telescope Mount Assembly (right) inside the DKIST enclosure (left).

Large Synoptic Survey Telescope

- 10 year survey of 10s of billions of objects in space and time
- F1.2, 8.4m primary, FOV 3.5d (9.6 sq d)
- 3.2 Gpixel camera, 2 sec readout, ~15 TB per night
- 825 visits per pointing (main survey = 18,000 sq d)
- ~10 M alerts per night, 60 sec latency
- Construction progressing, late 2022 start date for survey.

Recent construction image

… compared to artist's impression

National Center for Optical-Infrared Astronomy (NCOA)

AST Facilities Divestment

AST Facility Portfolio

- Portfolio Review Committee was commissioned in 2011 as broadly representative subcommittee of MPS Advisory Committee
- Portfolio Review Committee reported out in August 2012
  - Recommended a balance of small, medium and large programs that would require divestment of a number of operating telescopes from AST budget
  - Community Advice, including both the Astronomy and Astrophysics Advisory Committee (AAAC) and the National Academies Midterm Assessment of the decadal survey recommended (using the words of the AAAC) that "Strong efforts by NSF for facility divestment should continue as fast as is practical."

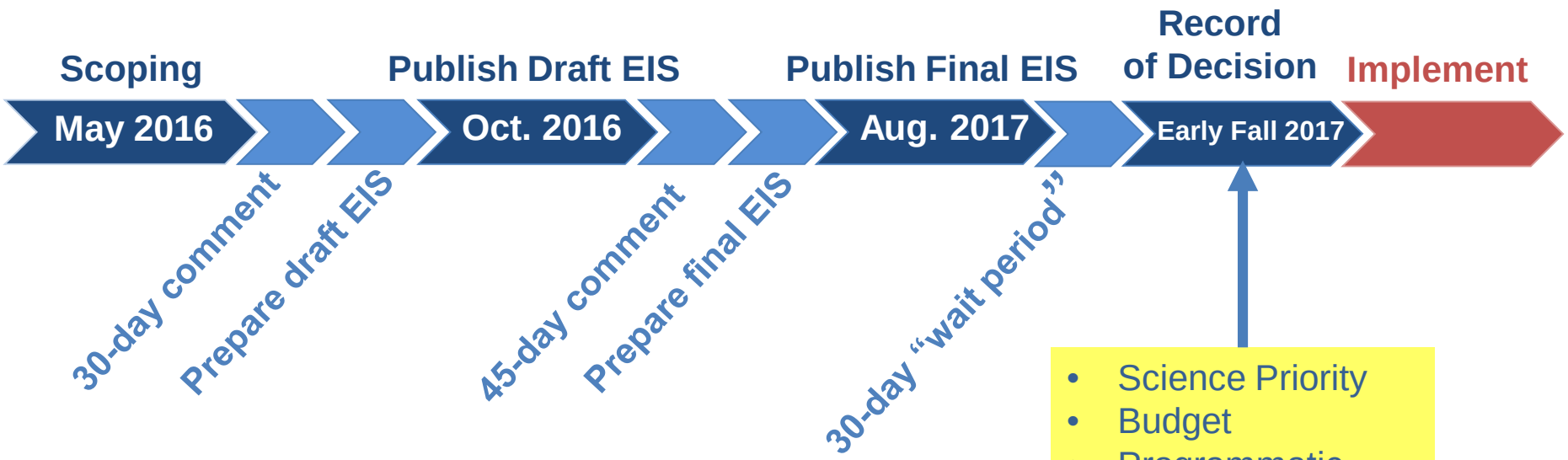
What Does "Divestment" Mean?

- The recommendations of the Portfolio Review Committee solely referred to removal of the funding of telescopes from the NSF/AST budget.
- Telescopes recommended for divestment are still important, and in some cases unique assets for astronomical research or other related uses.
- Hence the preferred divestment alternative, pursued vigorously by NSF since 2012, has been to find funding collaborations that enable some continued availability of NSF telescope assets for the research community.

Divestment Summary

Telescope	Status
KPNO 2.1m	Caltech-led consortium (Robo-AO) operating for FY 2016-2018.
Mayall 4m	Slated for DESI; bridge from NSF to DOE; NSF/DOE MOU for transition.
WIYN 3.5m	NOAO share to NASA-NSF Exoplanet Observational Research Program; NSF/NASA MOU in place; NASA instrument selected.
GBO	Separation from NRAO in FY 2017; ~25% collaboration for basic scope; draft Environmental Impact Statement (EIS) expected in September.
LBO/VLBA	Separation from NRAO in FY 2017; MOA with US Navy in place for 50%.
McMath-Pierce	No obvious partner opportunities; environmental study to kick off.
GONG/SOLIS	SOLIS is off Kitt Peak; GONG refurbishment; Interagency Agreement with NOAA signed (NOAA sharing GONG operations costs).
Sacramento Pk.	University consortium in development, and NSF funded NMSU for transition to consortium; draft EIS expected in September/October.
Arecibo	Formal EIS process under way, as well as evaluation of proposals for operation with reduced NSF funding. EIS released August 4. Record of Decision pending.
SOAR	Post-2020 status to be reviewed.

Divestment Background (Arecibo example)



- Science Priority
- Budget
- Programmatic considerations (collaborators, risk, viability)

Management Solicitation

National Historic Preservation Act (NHPA) Consultation

Endangered Species Act (ESA) Compliance

Record of Decision (RoD) will define the "Way Forward", which should be implemented (including any transition) by March 31, 2018.

Arecibo EIS Alternatives under Consideration:

- Continued NSF investment for science-focused operations (No-Action Alternative).
- Collaboration with interested parties for continued science-focused operations (Agency Preferred Alternative).
- Collaboration with interested parties for transition to education-focused operations.
- Mothballing of facilities.
- Partial deconstruction and site restoration.
- Full deconstruction and site restoration.

Arecibo divestment status**

- Federal Register notice of Arecibo Final EIS published August 4, 2017.
- Completed minimum 30 day “wait period” prior to issuing RoD.
- Programmatic Agreement on Section 106 of NHPA completion early September.
- RoD anticipated to be issued in early Fall.

** Arecibo is jointly funded by MPS/AST and GEO/AGS

Arecibo Management Solicitation

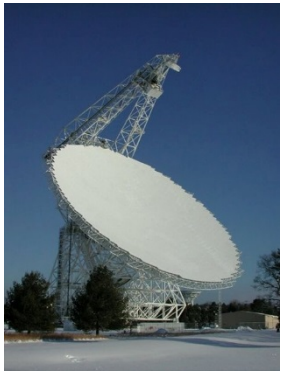
- Solicitation released January 25, 2017, proposals were due May 4, 2017.
- Reduces NSF support from $8.2M/yr (FY16) to $2M/yr over 5 year award.
- NASA committed to continue support near current level of $3.6M/yr.
- Award made if and only if RoD selects Collaboration alternative.
- Proposals panel-reviewed, proposal team meetings mid-July.
- Further proposal actions pending issuance of RoD.

Project Year	FY	NSF		
		MPS/AST	GEO/AGS	**TOTAL**
1	18/19	$3,600,000	$3,550,000	**$7,150,000**
2	19/20	$2,500,000	$2,500,000	**$5,000,000**
3	20/21	$1,750,000	$1,750,000	**$3,500,000**
4	21/22	$1,250,000	$1,250,000	**$2,500,000**
5	22/23	$1,000,000	$1,000,000	**$2,000,000**

Arecibo and Hurricane Maria

Green Bank divestment status

- EIS scoping meetings held Nov. 09, 2016.
- Draft EIS expected to be released early Fall followed by 45-day public comment period.
- Public meetings on Draft EIS late October.
- Currently (FY 2017), Green Bank receives 30% of $12.4M base budget from non-NSF sources: Breakthrough Prize Foundation, University of West Virginia, and others.
- Additional external funding needed.
- NSF currently working with other government agencies to secure additional funding commitments.



Sacramento Peak divestment status

- Former US Air Force site near Sunspot, NM.
- EIS scoping meetings held July 21, 2016.
- Draft EIS expected to be released this fall, followed by public meetings on Draft EIS.
- National Solar Observatory will cease operating Sacramento Peak at the end of FY 2017.
- New Mexico State University (NMSU) proposed to transition to operations by a NMSU-led consortium.

- NMSU proposal funded by NSF ($1.2M) from Sept 2016 for 24 months.
- NSF discussions with NMSU underway.

FY 18 Budget

AST Budget Pressures

- Must plan for possibility of no budget increases for the balance of the decade
- Need to balance facilities, small and mid-scale programs and individual investigator grants
- Mid-decadal survey report stated:

  "The LSST operations cost of $8 million at first, growing to $25 million, will be an additional burden on the AST budget in the first half of the next decade. The committee strongly supports the goal of a balanced program that includes facilities, medium scale initiatives, and small-scale initiatives. Maintaining this balance is a challenge at the current level of funding."

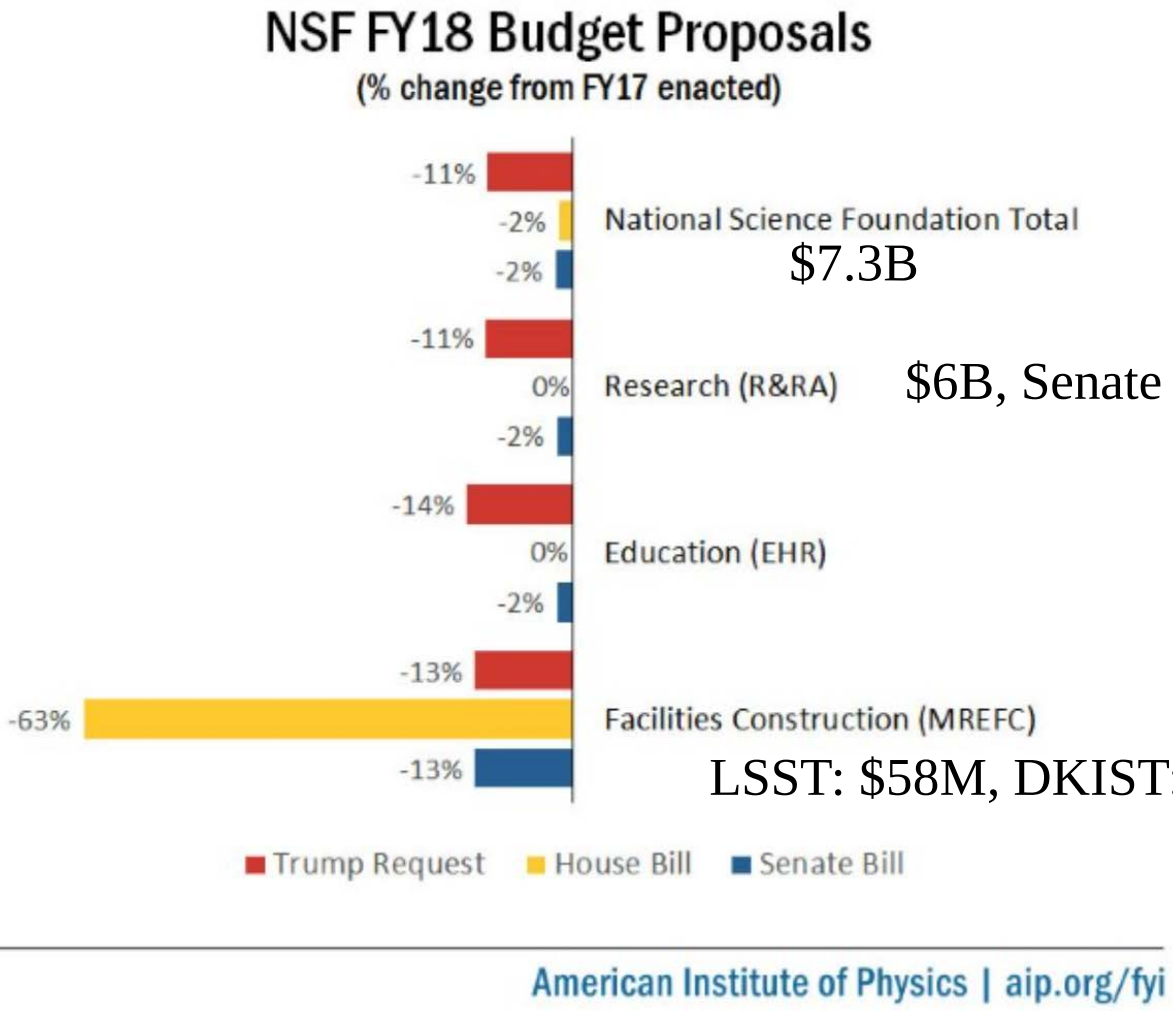
FY 2018 Pres. Budget Request

- Pres. Budget Request is 1st step in budgeting process.
- AST FY 2018 Request will
  - Largely preserve facility budgets
  - Preserve existing CGIs (multi-year grants)
  - Reduce AAG budget to $40.0, down from $43.4
  - Reduce MSIP budget to $6M, down from $18M
  - ATI program delayed

FY 2016/2017/2018 Budget

$M	FY16 Funding	FY17 Pres. Budget	FY18 Pres. Budget
AST Total	246.4	247.7	221.2
Facility Operations	149.1	155.2	154.8
AAG+ATI	57.4	51.4	41.2
Education/CAREER	10.5	10.9	9.6
MSIP	19.3	18.0	6.0
Other (mostly grants)	10.1	12.2	9.6
MREFC	113.0	87.1	77.8

FY 2018: Congress



FY 18 Budget

- Continuing resolution and Debt limit suspended through Dec. 5, 2017 but…
- Third leg is sequestration, due to return in FY 2018
- Sequestration
  - Budget control act of 2011 set spending caps for next 10 years.
  - Bipartisan budget act of 2015
    - Set caps $50B over for FY 16, $30B over for FY 17
    - Suspend debt limit until March 16, 2017