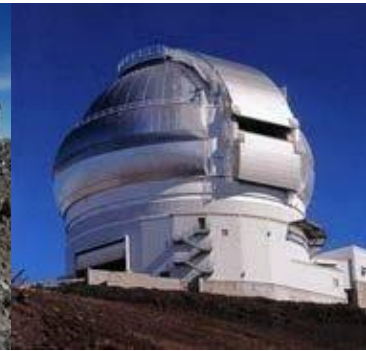


NSF/AST Update to CAA

Richard Green
Division Director,
MPS/AST



NSF's 10 "Big Ideas" for Future Investment

RESEARCH IDEAS

MATHEMATICAL
STATISTICAL
COMPUTATIONAL
FOUNDATIONS
ANALYTICS
DATA SCIENCE
HARNESSING THE
DATA REVOLUTION
FUNDAMENTAL RESEARCH
MACHINE
LEARNING
RESEARCH
DATA
CYBERINFRASTRUCTURE
CHALLENGES
STATISTICS
MODELING
DATA
MINING
HUMAN DATA INTERFACE
SYSTEMS
PROFESSOR
INTERNET
OF THINGS
RESEARCH
INTEGRATION
OPERATION
EDUCATION
WORKFORCE
DISCOVERY

Harnessing Data for 21st Century Science and Engineering

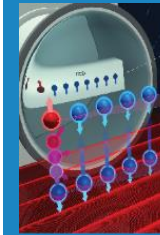
Work at the Human-Technology Frontier: Shaping the Future



Windows on the Universe: The Era of Multi-messenger Astrophysics



The Quantum Leap: Leading the Next Quantum Revolution



Understanding the Rules of Life: Predicting Phenotype



PROCESS IDEAS

Mid-scale Research Infrastructure



NSF 2026



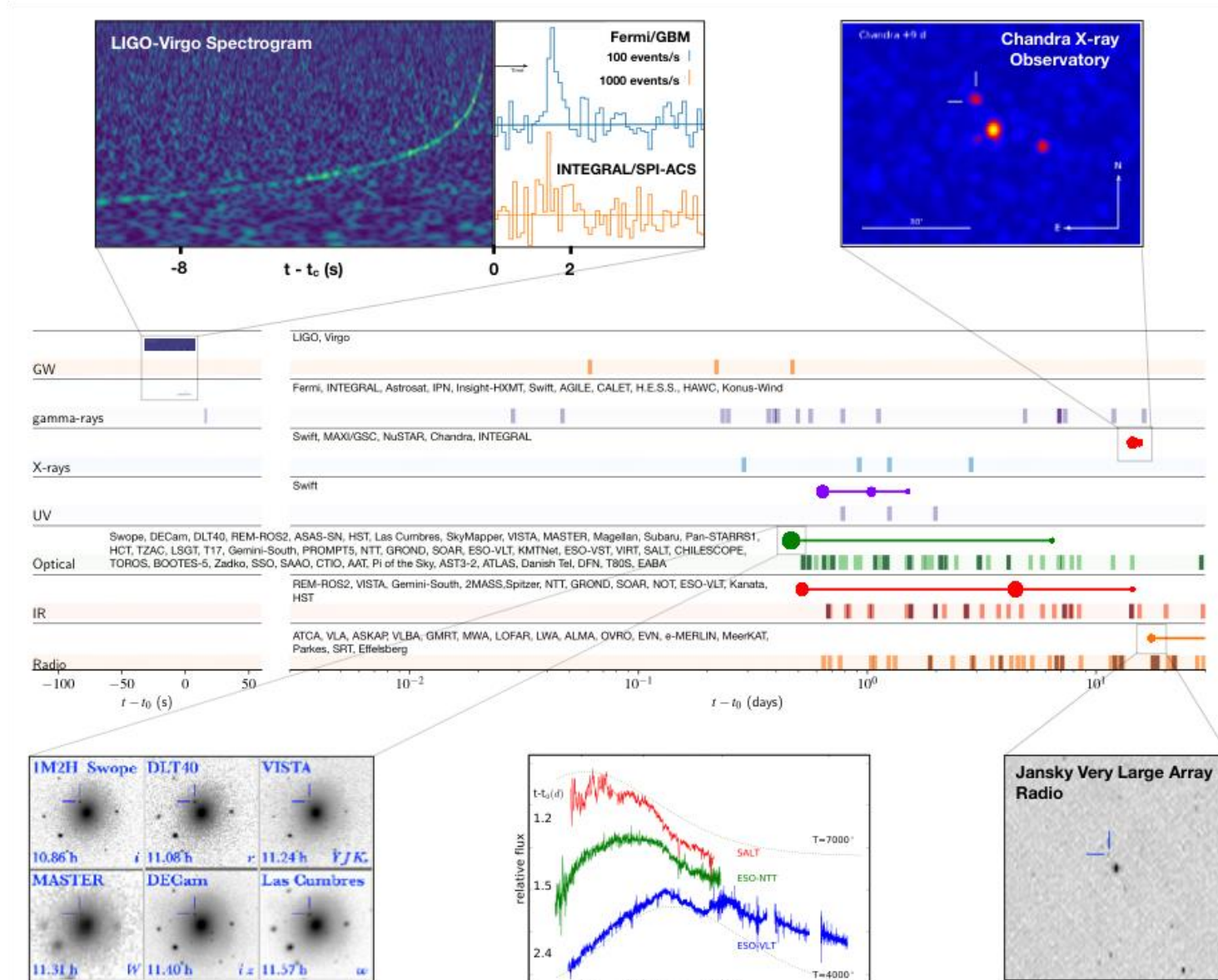
Growing Convergence Research at NSF



NSF INCLUDES: Enhancing STEM through Diversity and Inclusion



Binary Neutron Star Merger in NGC 4993



LSST Current Construction Site



Operations in 2022



DKIST Current Construction Site



Operations in 2019



NSF's National Center for Optical-Infrared Astronomy (NCOA) integrates the NSF-funded entities -- National Optical Astronomy Observatory (NOAO), Gemini Observatory, and Large Synoptic Survey Telescope (LSST) operations -- under a single organizational framework, managed by one management organization (MO).

- NCOA is on schedule for stand-up about 1 Oct 2018.
- LSST operations is on track for initial funding in FY 2019.

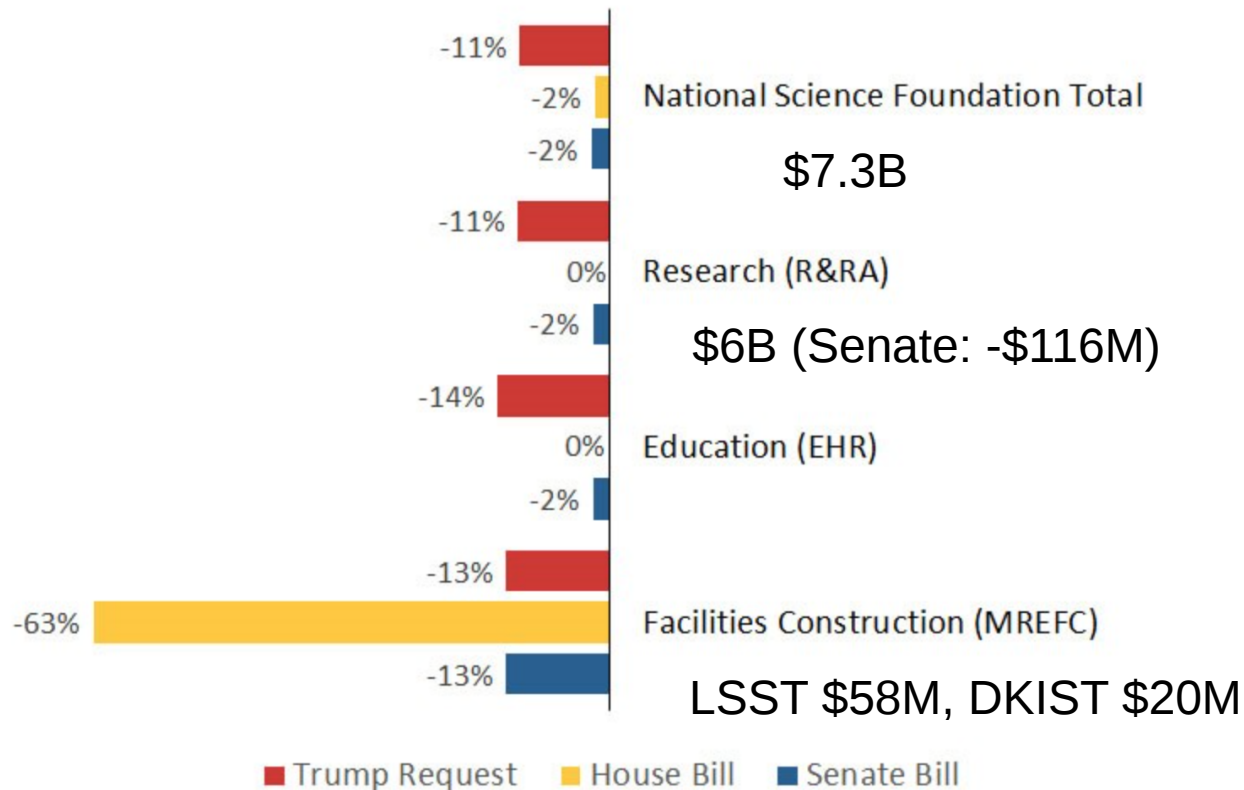
Background is a montage of major facilities under NCOA.



FY 2018 Budget Proposals

NSF FY18 Budget Proposals

(% change from FY17 enacted)



American Institute of Physics | aip.org/fyi



FY 2018 Budget

- Currently under a continuing resolution through Dec. 8, 2017
- Potential risks to AST budget and operations after Dec. 8...
 - Range of R&RA from President's FY 2018 request of -11% to House appropriation of flat funding
 - Under House or Senate bills sequestration is likely to be triggered
 - Budget Control Act of 2011 set spending caps for 10 years
 - Debt ceiling likely to come up again in March
 - Possibilities of government shutdown, continuing resolutions.



Longer Range Budget

- NSF practice is that operations costs of MREFC-funded major new facilities are borne by the Division that is the host discipline.
- AST is absorbing DKIST operations into current budget planning.
- LSST operations are the next wedge. In the event of continued flat funding (or less) and no change in policy, a major realignment of facility support will be required to preserve a balance with the grants program.
- Recognition of this issue prompted AST to hold the Portfolio Review in 2012.

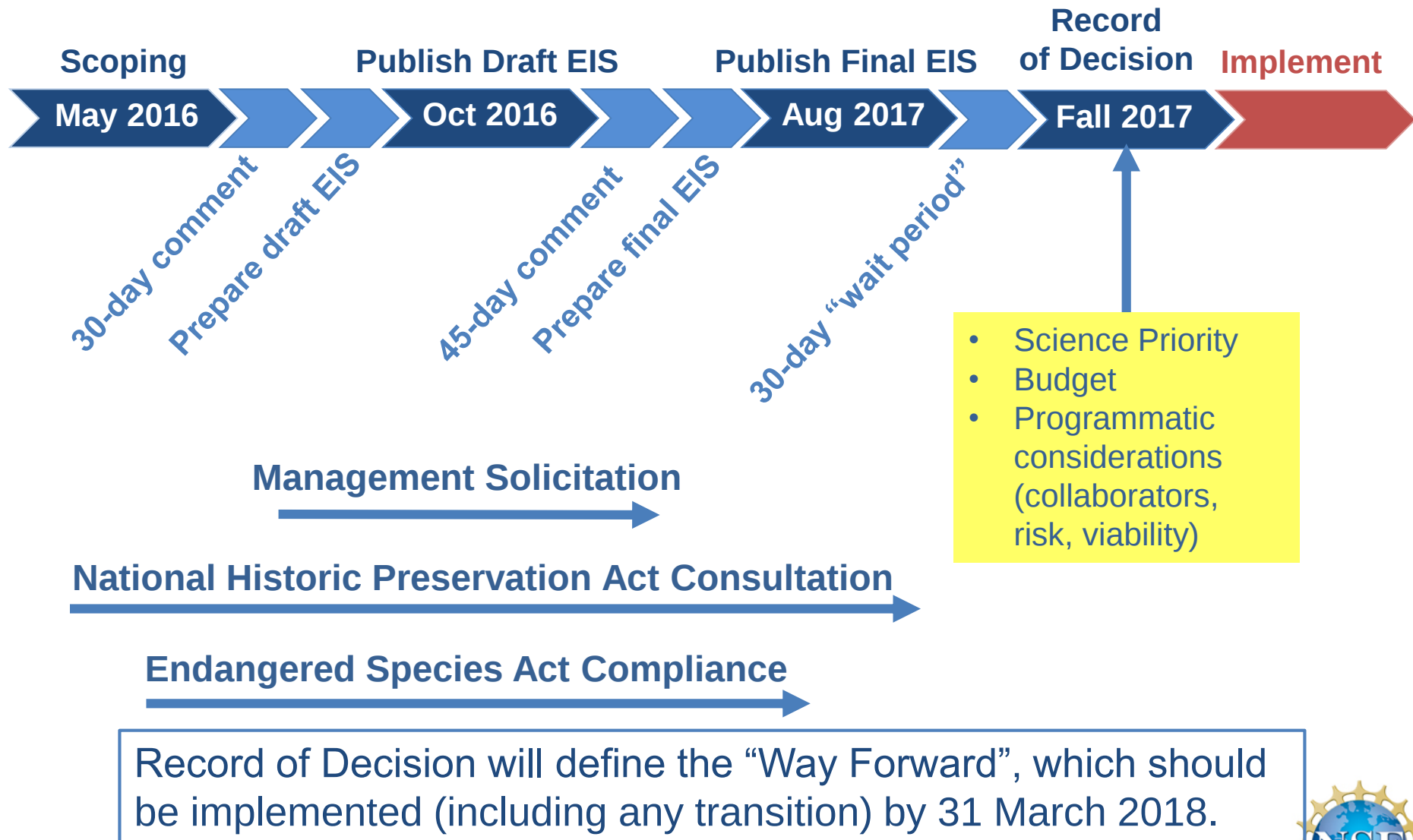


Background: AST Divestment

- AST Portfolio Review Report (MPSAC subcommittee) recommended divesting a number of telescopes from AST budget.
- Divestment needed to enable support of new highest priority facilities, while balancing support for individual investigator science.
- The process shows AST's seriousness in changing the complement of cutting edge national facilities and is scoped to save \$10-15M/yr for new operations.
- Subsequent AST actions:
 - Pursued funding collaborations aggressively.
 - Solicited input on innovative operations models.
 - Carried out engineering feasibility studies and baseline environmental reviews for many facilities.
 - Embarked on preparation of formal Environmental Impact Statements (EIS) as part of the decision process for three facilities: Arecibo, Green Bank, Sacramento Peak.
- Status officially updated by NSF Dear Colleague Letter 17-079, April 27, 2017.



Arecibo EIS: How the Parts Fit Together



Arecibo Status

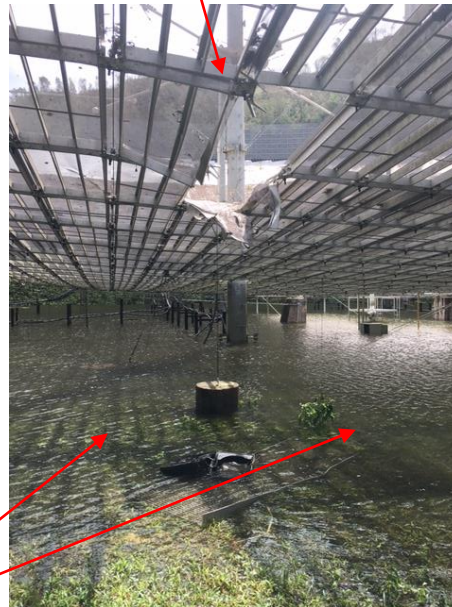
- NSF was near the conclusion of the Environmental Impact Statement process at the time Hurricane Maria hit Puerto Rico
- NSF needed to pause the process, and the progress toward a Record of Decision, to determine whether the hurricane caused significant changes that required further assessment
- The facility sustained significant damage, but less than anticipated, considering that it was directly in the path of Hurricane Maria. (Peak winds recorded were 108 mph.)
- Damage includes mesh panels in the dish and loss of the line feed for atmospheric radar.
- Rough estimates have been made for repair and restoration; the origin and schedule for funding depends on the outcome of distribution to multiple agencies of emergency relief funding for Puerto Rico.



Arecibo Observatory: Hurricane Maria



Damaged panels



12 m damage

standing water

truncated line feed



- Damage to Arecibo Observatory is less than originally feared.

Green Bank divestment

- To accommodate full support of the facilities and programs that best deliver the 2010 decadal survey science, the 2012 Portfolio Review recommended AST divestment of lower priority facilities, including Green Bank.
- The major facility still enables pulsar science and associated tests of gravitation, molecular spectroscopy, and bi-static asteroid characterization.
- Continued community access for unique capabilities was recommended by the 2017 report of the Astronomy and Astrophysics Advisory Committee.
- Realization of Portfolio Review and AAAC recommendations aims for AST to provide a minority share of operations support.



Green Bank divestment status

- EIS scoping meetings held Nov. 09, 2016.
- Draft EIS expected to be released **Nov. 10th**, followed by 45-day public comment period.
- Public meetings on Draft EIS **Nov 30th**.
- EIS process will conclude in second half of 2018.
- In FY 2017, Green Bank received 30% of \$12.4M base budget from non-NSF sources: Breakthrough Prize Foundation, University of West Virginia, and others.
- Additional external funding needed.
- NSF/AST currently working to secure additional funding commitments.



Sacramento Peak divestment

- The Daniel K. Inouye Solar Telescope on Maui will be the world's premier ground-based solar telescope, with full operations planned for 2019.



- The Dunn Solar Telescope on Sacramento Peak retains some value as a platform for solar instrument development and broadening the community of solar observers.



Sacramento Peak divestment status

- EIS scoping meetings held July 21, 2016.
- Draft EIS expected to be released **late November 2017**, public meetings on Draft EIS in **December/January**.
- National Solar Observatory will cease operating Sacramento Peak at the end of CY 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.
- EIS process expected to conclude in second half of 2018.



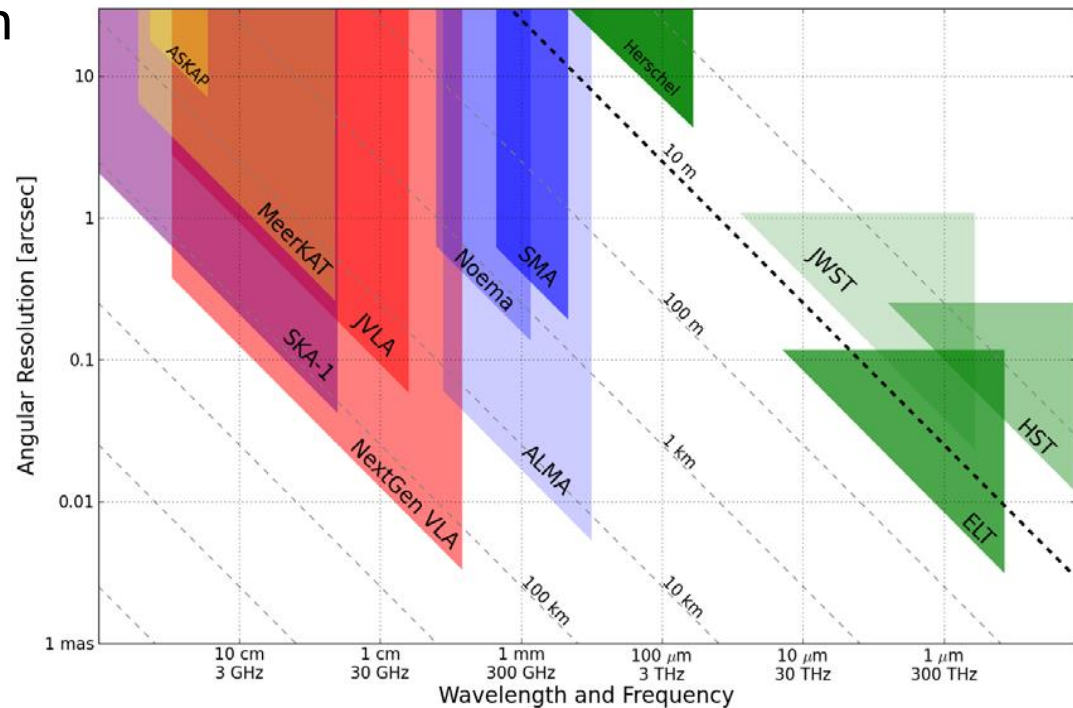
Related Divestment Status

- Long Baseline Observatory has operated the VLBA since October 1, 2016, through a CA with AUI.
- US Naval Observatory provides funding to LBO for accurate determination of Earth Orientation Parameters.
- Fortunate that damage to St. Croix station from Hurricane Maria was minor; critical to USNO continuing partnership.
- The Mayall 4m telescope on Kitt Peak will have its last public access night with its traditional instrument suite on Nov 12th. It will then undergo an upgrade in support of DOE-funded operations of the Dark Energy Spectroscopic Instrument (DESI), starting in early 2019.



AST Decadal Survey Preparations

- NRAO held a series of three Kavli-sponsored workshops to identify and prioritize the key scientific problems the RMS community would address in the coming decade.
- Many of the scientific goals can be achieved with a concept called Next Generation VLA, including
 - Unveiling the Formation of Solar System Analogues
 - Probing the Initial Conditions for Planetary Systems and Life with Astrochemistry
- Funded technical concept studies are underway within NRAO



AST Decadal Survey Preparations

- NOAO is collecting OIR community white papers
- Submission by Nov 20th for public meeting Feb 20-21, 2018.
- Topics addressed to date include
 - Community participation in GSMT science
 - Dedicated wide-field spectroscopic survey telescope
 - Enhanced time-domain telescope network (GW follow-up)
 - Data science development for LSST and other large datasets





Cosmic Microwave Background (CMB)



- CMB Stage 4 goals: testing inflation, determining the number and masses of the neutrinos, constraining possible new light relic particles, providing precise constraints on the nature of dark energy, and testing general relativity on large scales.
- Two sites: South Pole and Atacama
- Fourteen small (0.5m) telescopes and three large (6m) telescopes, with 512K total detectors
- Report released to AAAC by its subcommittee on 10/23.



AST Decadal Survey Considerations

- Current schedule or small additional delay would allow highest priority recommendations to impact FY23 budget request.
- Several of the projects being developed (CMB S4, GSMT participation, Wide-field spectroscopic telescope) would have reduced programmatic impact and/or additional funding challenges if the survey start were more substantially delayed (and they were then found to have highest priority).
- Advisory committee emphasis on program balance and NSF mid-scale initiative would be aided by survey ranking of top mid-scale projects as well as large-scale.

