NSF AST Update

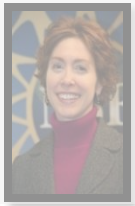
Committee on Astronomy & Astrophysics

Jim Ulvestad

March 3, 2014

- AST Division: Staff Changes, Key Events
- Science and Technical Highlights
- Status of Response to Decadal Survey
- Portfolio Review Status
- The Budget
- Proposed Principles for Access to Data, Projects & Facilities
- OIR System Study

AST Scientific Staff Changes Since March 2013

- Patricia Knezek, Deputy DD, started March 2013
- Dana Lehr returned to NRAO Program Officer

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

- Andrew Clegg: Spectrum Management & EARS, left on Jan. 10. Important role, job posted, see speaker for info

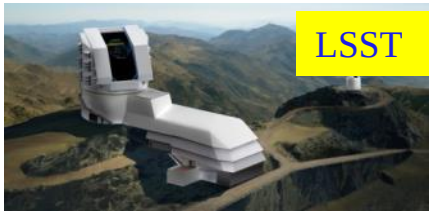


- Rotators finished: Tom Statler, Ed Ajhar. Dan Evans took over as Individual Investigator Program Lead


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

MPS/AST Strategy, to 2020 and Beyond

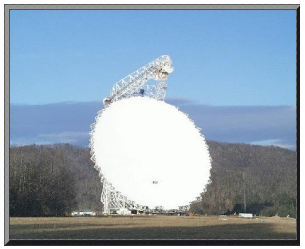
Major Facilities

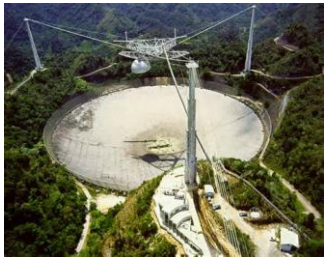


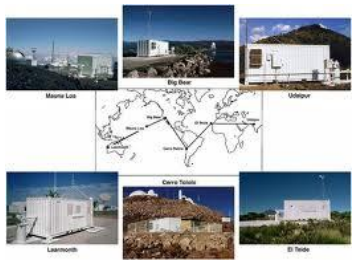
DKIST

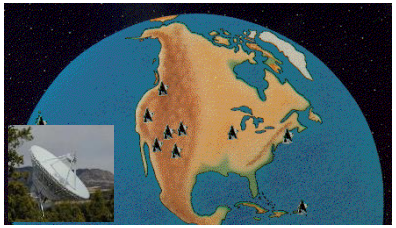
ALMA

Divestment or Partnership



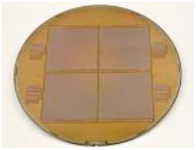


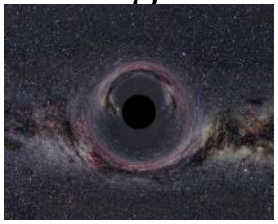


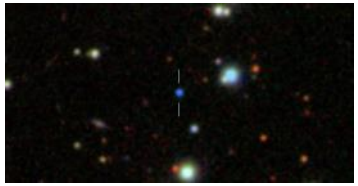


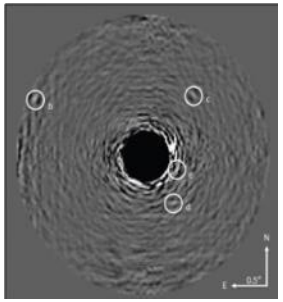
Mid-Scale Innovations

Individual Investigators









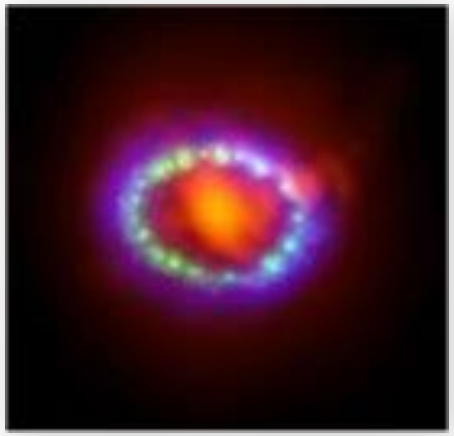
Key AST Events Since March 2013

- March: FY 2013 Appropriation; ALMA Inauguration
- June: Mid-Scale Innovations Program solicitation released
- June: NSF FY 2013 Operating Plan approved
- July: Dr. France Cordova nominated as new NSF director
- August: ATST (now DKIST) rebaseline approved by NSB
- August: 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
- December: Portfolio Review Dear Colleague Letter released
- January 2014: FY 2014 NSF Appropriation

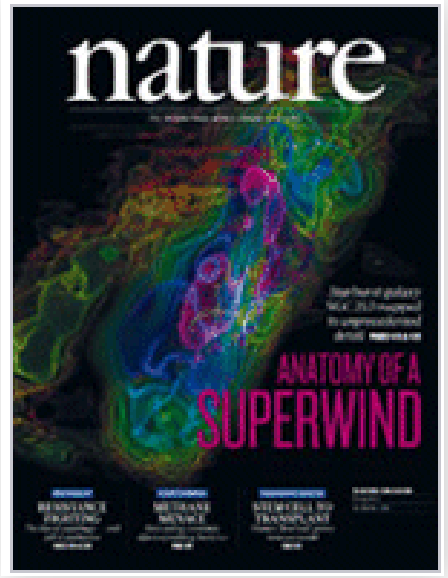
ALMA Status

- All 66 antennas and initial suite of receivers accepted; 62 at the high site
- Power plant in operation
- Final construction activities underway for completion by September 2014
- ALMA inauguration in March 2013

ALMA High-Impact Science Results



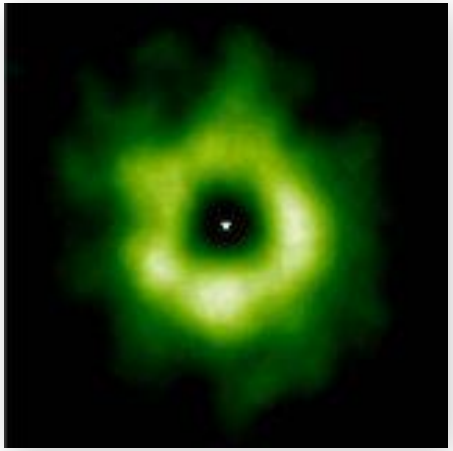
Dust formation in supernova 1987A
Indebetouw et al. 2014



Galaxy superwind
Bollato et al. 2013, and a Nature "Image of the Year"

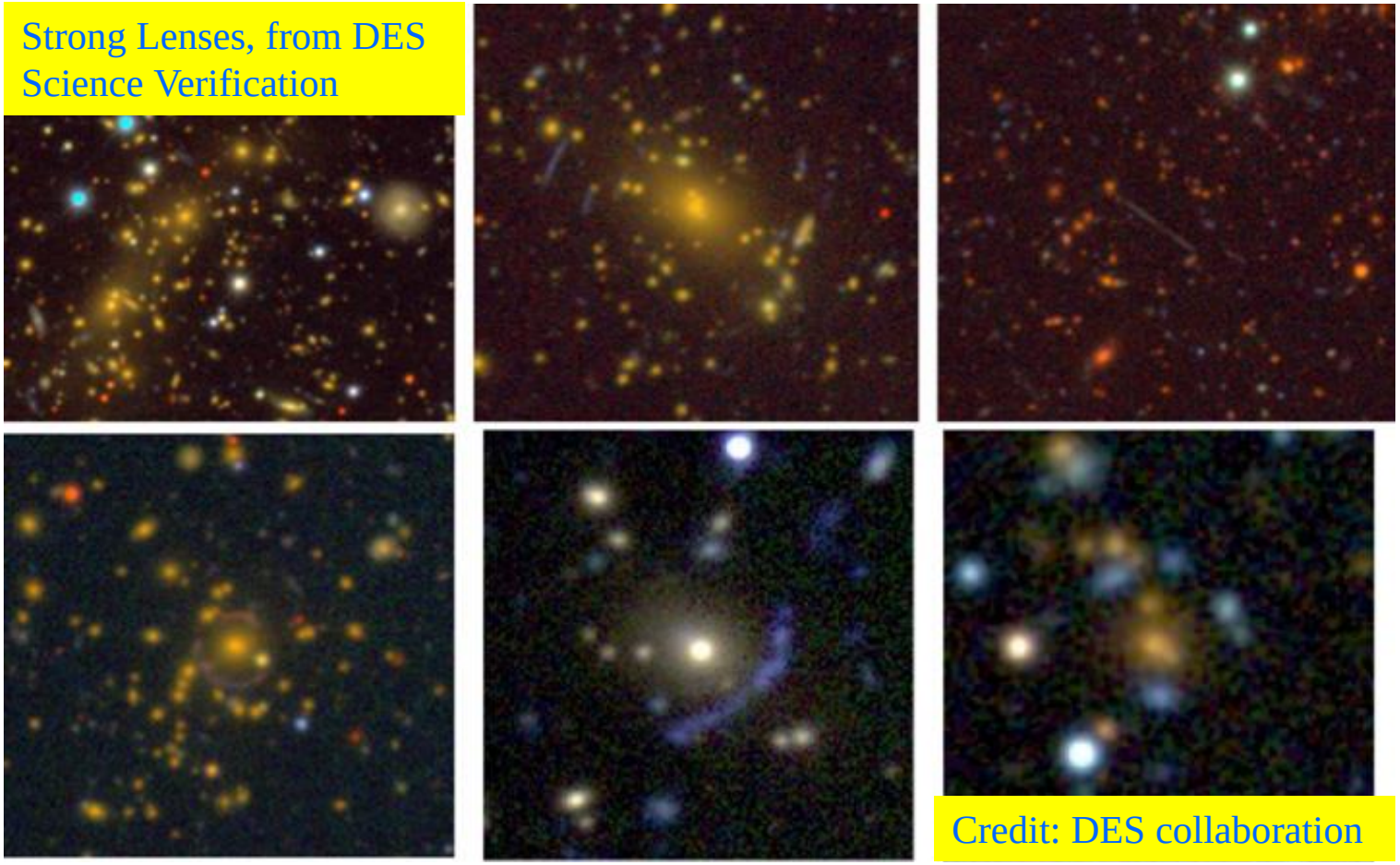
The coldest place in the known universe (~1K)
Sahai et al. 2013

Imaging the "snow line" in an infant solar system
Qi et al. 2013



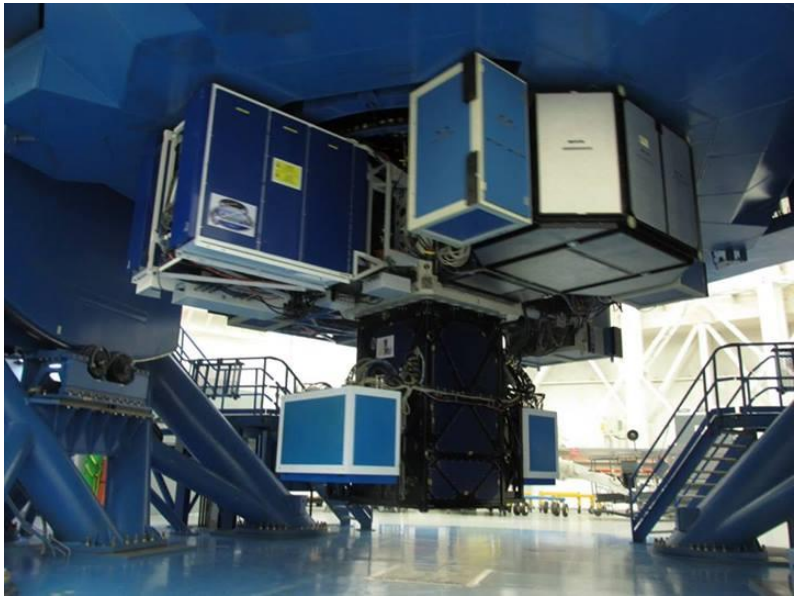
CTIO/Blanco:Dark Energy Survey (DES)

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



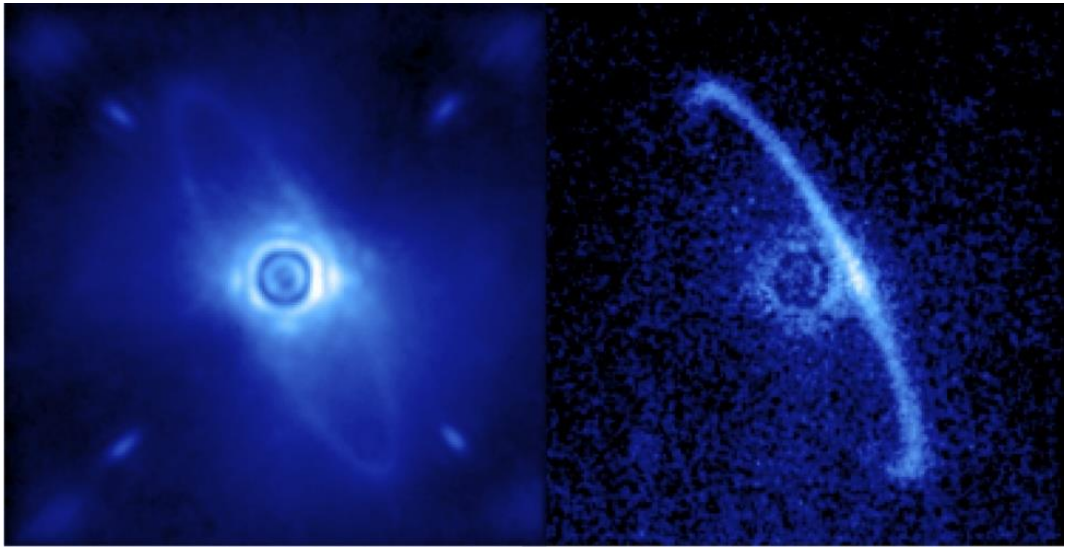
Gemini Planet Imager (GPI)

- 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



GPI First Light

- GPI passed commissioning tests at Gemini-South
  - Able to detect and characterize giant planets at $<10^{-6}$ brightness of parent star
  - Campaign to image ~600 exoplanets orbiting nearby stars begins later this year.



First light with the Gemini Planet Imager: Dust ring 2x orbit of Neptune around HR 4796A (220 LY distance). Left image: total light; Right image: polarized light. Starlight is blocked.
(2014 AURA/Gemini)

The Telescope Formerly Known as ATST

DKIST enclosure, Bilbao, Spain

Coudé rotator construction in Rockford, IL

- Telescope renamed the Daniel K. Inouye Solar Telescope (DKIST) in December 2013
- Operational status scheduled for mid-2019

DKIST telescope pier, Haleakala

Decadal Survey Status

Decadal Survey (NWNH) Status

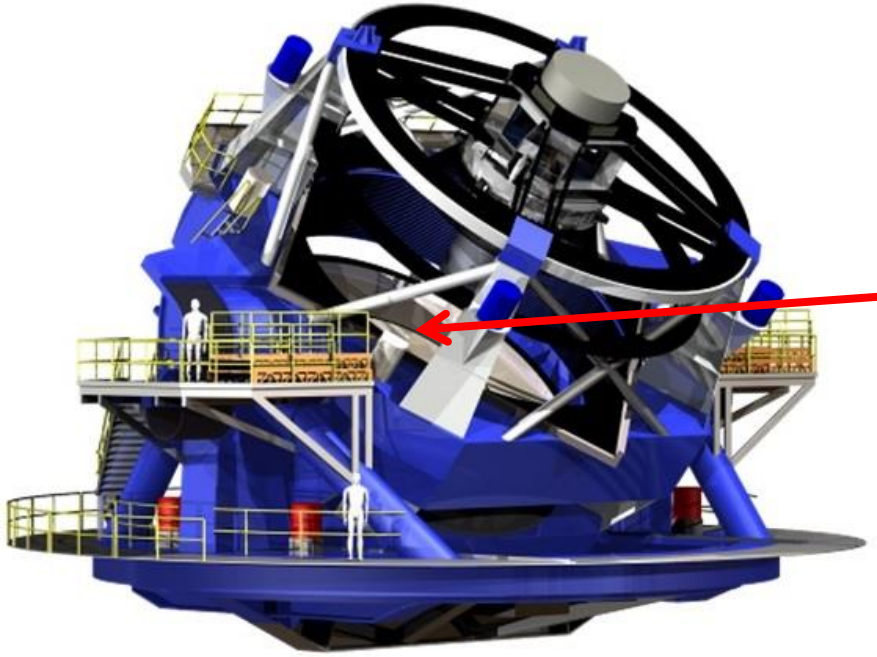
- LSST was in FY 2014 President's request, Final Design Review held in December; aiming for July 1 start
- MSIP is in FY 2014 President's request, solicitation was released, full proposals in preparation
- NSF and community participating in TMT Board, Science Advisory Committee, via planning award
- 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 Review Timeline

August 2010	#1 large, ground-based project in NAS decadal survey
Aug/Sept 2011	NSF Preliminary Design Review
July 2012	NSB advances LSST to Final Readiness stage
April 2013	MREFC start requested in President's FY 2014 Budget
December 2013	NSF Final Design Review
March 2014	NSF MREFC Panel, Director's Review Board (We are here)
May 2014	NSB hears action item for award approval
May 2014	DOE CD-3a (long-lead procurements for camera)
July 2014	Potential start date for MREFC award
Q4, 2014	DOE CD-2 (baseline cost for camera project)

LSST Recent Progress

- Primary-Tertiary Mirror on track to complete final polishing by summer 2014
- Secondary mirror M2 contract in place: ITT/Exelis (design, option to build)
- M2 Hexapod & Camera Rotator contract in place: Moog/CSA (same approach)
- Telescope Mount Assembly vendor selected; NSF approval requested
- Summit Facility Construction bids due in early March



NSF/DOE Status of LSST

- DOE requested Major Item of Equipment (MIE) start for camera in FY 2013; not approved due to DOE Continuing Resolution
  - Project re-planned for FY 2014 MIE start
- MIE camera start is in DOE FY14 appropriation
- LSST MREFC start is in NSF FY14 appropriation
- NSF Final Design Review (FDR) held December 2-6, 2013, with 15 panel members

- From the FDR Report Executive Summary
  - "The Panel regards the project team as very strong, with well-developed plans, schedules and cost estimates. We have no hesitation in our assessment that the project will be ready for start of construction on July 1, 2014."

Mid-Scale Innovations Program (MSIP)

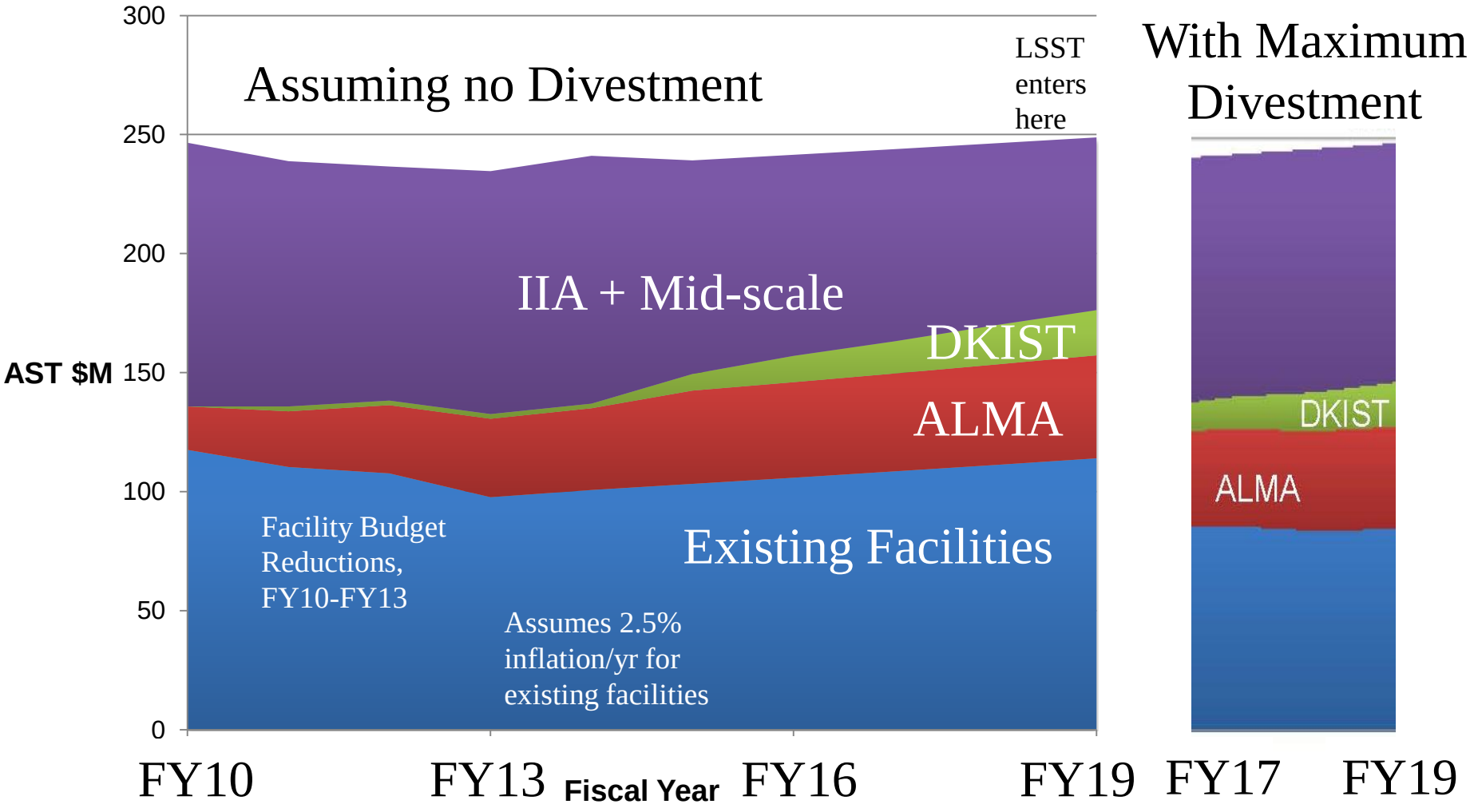
- MSIP was #2 priority large program recommended by *New Worlds, New Horizons* decadal survey
- Solicitation NSF 13-567 allowed range of $4M to $40M
  - Estimated Number of Awards: 2 to 4
- 38 pre-proposals (8-page project description) received at deadline of September 16, 2013, in four categories
  - Mid-Scale Science Projects
  - Mid-Scale Facilities
  - Development Investments
  - Open Access Capabilities ($4 million minimum waived)
- 12 groups invited to submit full proposals
  - Full-proposal due date is March 12, 2014

Portfolio Review

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
  - Expect outcome and preferred alternatives in FY 2015

AST Portfolio Scenarios



AST budget assumption: FY15=FY14, 1%/yr growth thereafter

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 Appropriation, FY 2014-15

In $M	FY12 Plan	FY13 Req	FY13 Plan	FY14 Req	FY14 App.
NSF	7033	7373	6884	7626	7172
R&RA	5689	5983	5545	6212	5810
MREFC	197	196	196	210	200
MPS	1309	1345	1249	1386	???
AST	235	245	233	244	???

- FY 2014 NSF Plan submitted to Congress last week
- FY 2015 NSF Budget Request
  - Top-level President's request on March 4
  - NSF budget presentation on March 10

FY 2014 AST Plan

- Estimated FY 2014 Plan is expected to be shown in FY 2015 budget request, still subject to approval by Congress
- MREFC
  - Requested $42.0 million for DKIST and $27.50 million for LSST
  - Congress reduced MREFC line by $10.12 million to $200.00 million, funding ongoing projects at request level, remainder for LSST
    - Permission given to request fund transfers
- Senate report language incorporated by reference
  - Fund domestic NRAO at FY 2012 level
  - Require 60-day notice, including cost, to divest any operating facilities

FY14 Individual Investigator Programs

- AAG (general research grants)
  - Number of proposals approximately equal to FY 2013
  - Expect earlier award decisions than last year because of earlier appropriation
  - Expect 12-13% funding rate
  - No current plan to change due dates or mechanisms
- CAREER: Six new awards in process
- AAPF: Nine offers accepted
- REU sites: Six new awards completed
- ATI: Proposals in hand, under evaluation

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

OIR System Study

Status of OIR System Study

- Awarded February 15, 2014, for 12 months: “A Strategy to Optimize the U.S. Optical/Infrared System in the Era of the Large Synoptic Survey Telescope
  - Study to be carried out by committee under auspices of CAA
  - Concerned with O/IR system as a whole
    - Observing capabilities
    - Instrumentation
    - Data management
    - Human resources
  - Not tied to maximizing science output of LSST

NSF Goals of O/IR Study

- Goal 1: Position the observational, instrumentation, data management, and support capabilities in U.S. O/IR astronomy to best address the science frontiers and science goals as identified in the decadal surveys *"New Worlds, New Horizons in Astronomy and Astrophysics"* and *"Vision and Voyages for Planetary Sciences in the Decade 2013-2022"* in the era of LSST as the primary new federal asset in the O/IR portfolio.

- Goal 2: Achieve the best science return from the NSF investment in night-time O/IR astronomy, including, but not limited to, the role of the O/IR system in delivering LSST-related science.

Desired Study Parameters

- Working description of the O/IR system, its capabilities and resources, inclusive of federal and non-federal assets
- System-wide engagement of the community
  - Includes careful selection of committee membership
  - Concern about community buy-in, so participation is needed
- Consideration of other past and ongoing planning activities
  - Examples include ALTAIR, ReSTAR, System Roadmap Committee, O/IR panel of decadal survey, etc.
- Maximize access to system capabilities for the U.S. community, whenever possible
- Don't focus exclusively on optimizing LSST
- Focus on science outcomes and needed coordination, not particular organizational structures

Questions/Discussion