National Aeronautics and Space Administration

Astrophysics

Report to the NAC Astrophysics Subcommittee

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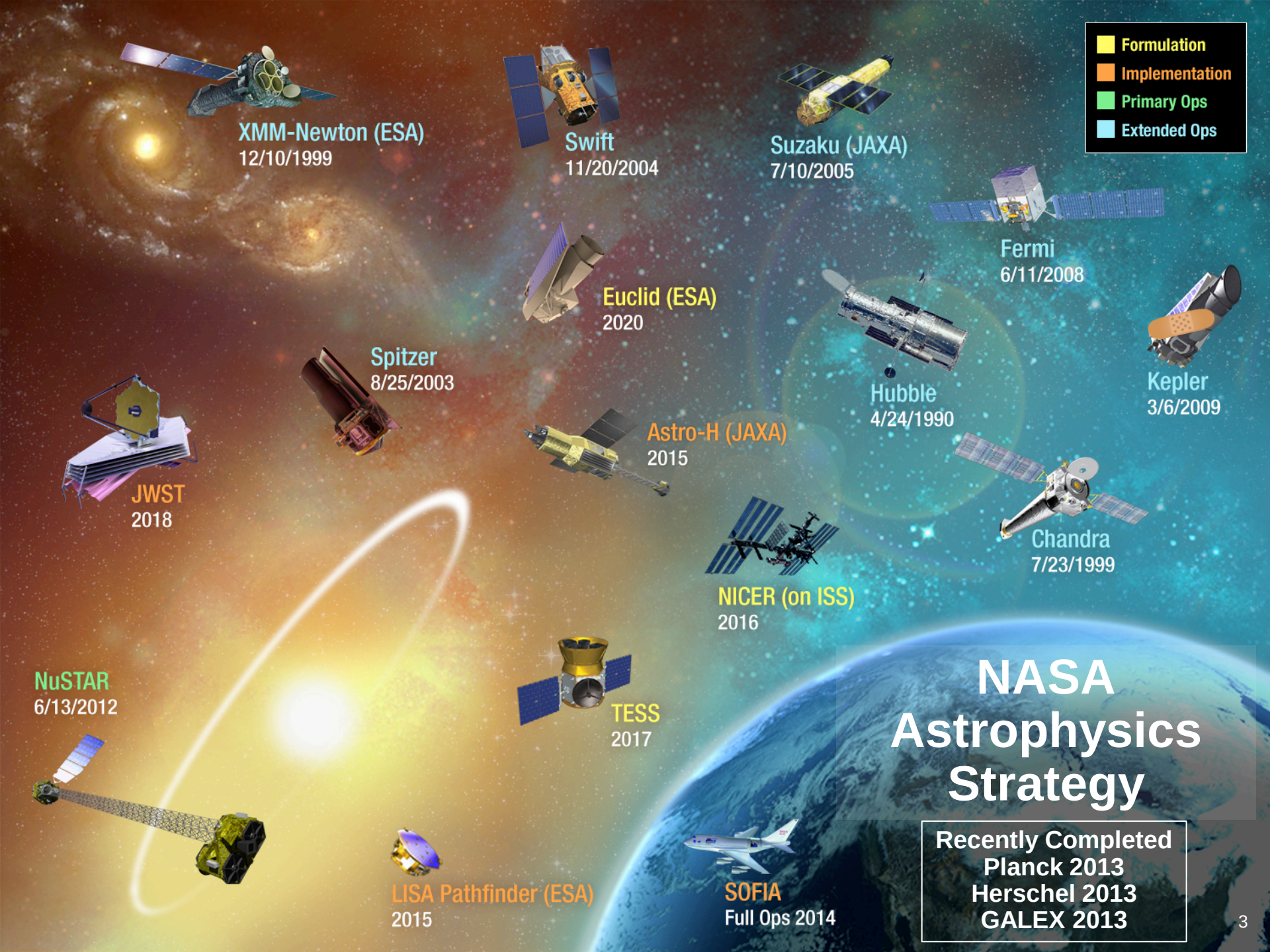
Director, Astrophysics Division

November 19, 2013

www.nasa.gov

Outline

- NASA Astrophysics Strategy
  - Why Astrophysics
  - The Big Picture
  - Astrophysics Strategy
  - Astrophysics Implementation Plan
- NASA Astrophysics Programs
  - Impact of Government Shutdown
  - Mission updates (JWST, Kepler, SOFIA)
  - Study of potential use of the 2.4m telescope assets for WFIRST (AFTA)
  - Suborbital programs; Research selection rates
- NASA Astrophysics Budget
  - FY13 Appropriation
  - FY14 President's Budget Request
- Questions and Answers


Formulation
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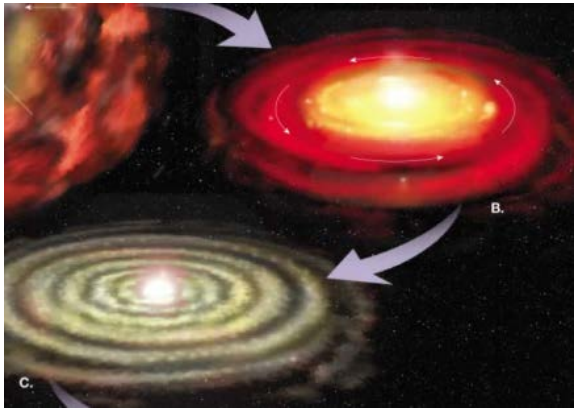
SOFIA
Full Ops 2014
NASA Astrophysics Strategy
Recently Completed
Planck 2013
Herschel 2013
GALEX 2013

Why Astrophysics?

Astrophysics is humankind's scientific endeavor to understand the universe and our place in it.

1. How did our universe begin and evolve?

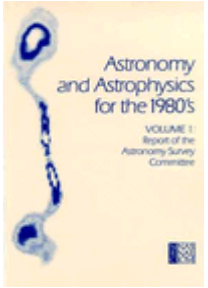


2. How did galaxies, stars, and planets come to be?

3. Are We Alone?

These national strategic drivers are enduring

1972



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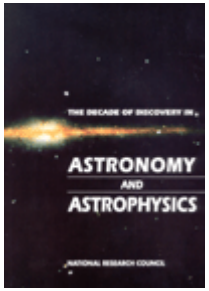


1991

2001

2010

The Big Picture

- This remains a time of scientific opportunity for NASA Astrophysics.
  - We are poised to answer the most compelling science questions.
  - The budget for NASA astrophysics, which includes JWST, is at a high level.
  - NASA continues to operate large and small space-based observatories spanning the electromagnetic spectrum, including multiple Great Observatories.
  - The James Webb Space Telescope, the highest priority of the community, is on schedule and fully funded for an October 2018 launch.
  - NASA continues to develop contributions to international missions for launch this decade.
  - NASA has downselected two new Explorer projects to begin development for launch in this decade.
  - NASA continues to support individual investigators for data analysis, theory, and technology investigations through open, competitive, peer reviewed processes.
  - NASA is preparing for the strategic mission that will follow JWST.
- The budgetary future remains uncertain.
  - Priorities must be used to guide difficult budget choices.

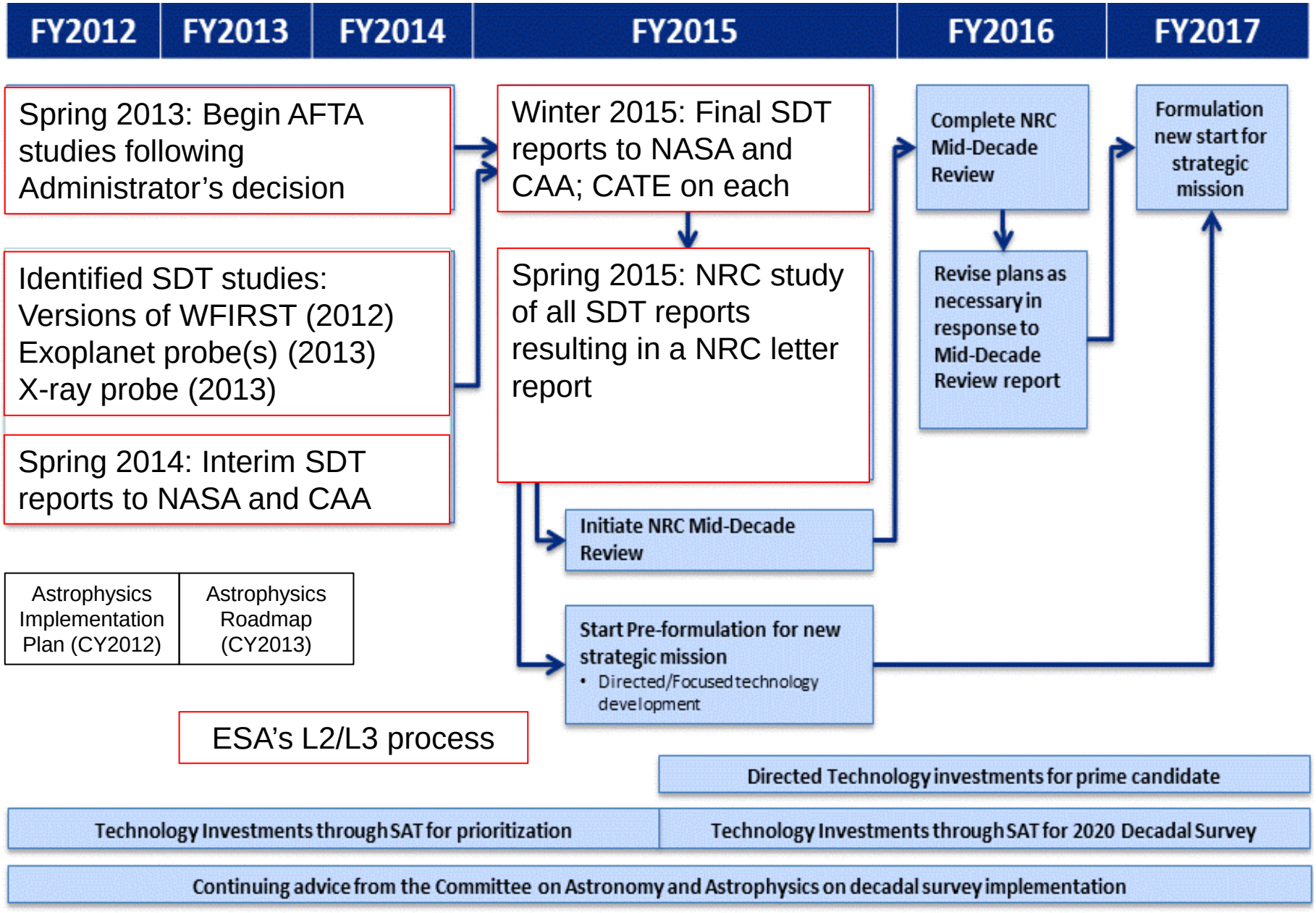
Astrophysics Strategy

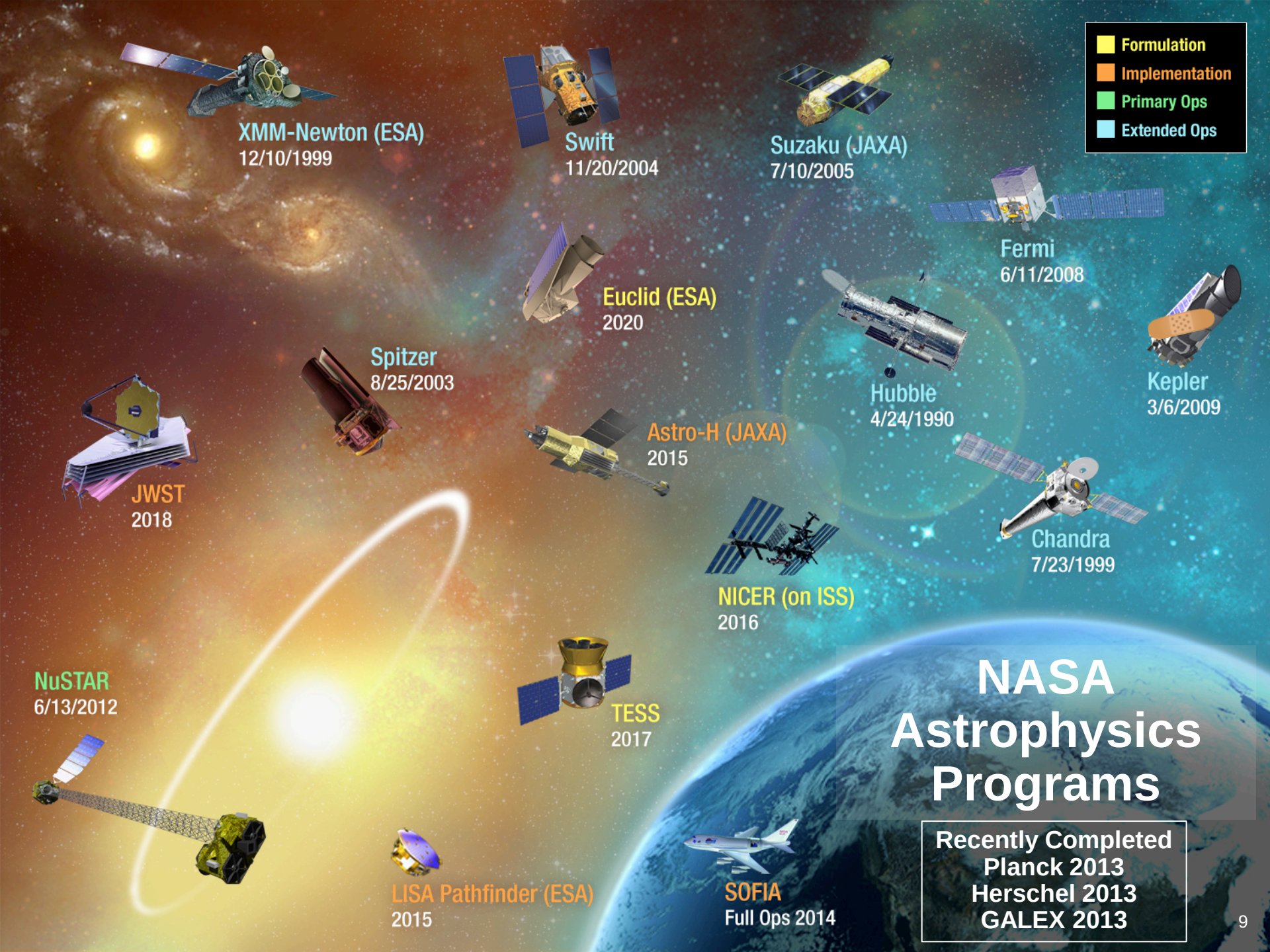
- Use the scientific priorities of the 2010 Decadal Survey to guide strategy and inform choices.
- There is inadequate available budget to implement the 2010 Decadal Survey recommendations as written.
- In the absence of new missions, progress against decadal priorities is maintained through the core program: research and analysis (R&A), supporting and enabling technology development, operation of existing missions and their GO programs, the suborbital programs, and Explorer opportunities.
- A goal is to be prepared to start a new strategic Astrophysics mission to follow JWST as soon as funding becomes available, while continuing to advance Decadal Survey science during the interim.

Astrophysics Strategy

- In order to be prepared for a new mission, a near term program of science definition teams, mission concept studies and technology development is being undertaken with the goal of informing a mid-decade decision on whether to begin formulation.
- Moderate missions (“probes”) are being studied, in addition to a large mission (WFIRST), to be prepared for a mid-decade decision.
- Mission concepts studied derive from the science objectives of the prioritized missions and recommendations in the 2010 Decadal Survey.
  - AFTA (WFIRST using existing 2.4 m telescopes)
  - WFIRST (2 design reference missions already studied, including WFIRST-probe)
  - X-ray Astrophysics Probe (moderate mission addressing IXO science)
  - Exoplanet Probes (moderate missions using internal or external occulters)

Preparing the next strategic mission

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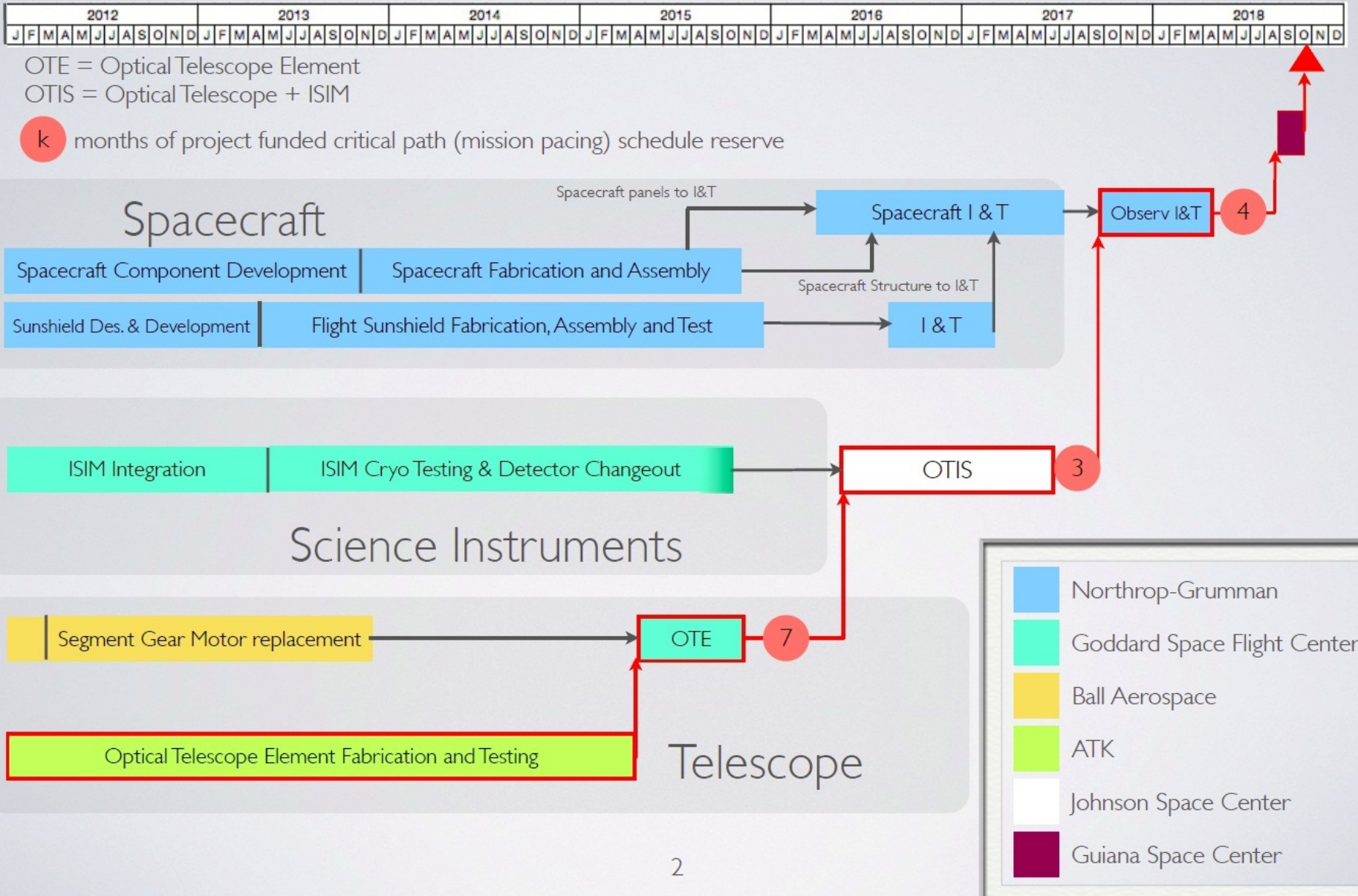
Major Impacts of Government Shutdown

- The 2013-2014 Antarctic long duration balloon campaign is cancelled.
  - The shutdown came at a critical times, and there is insufficient resources and insufficient time to prepare the McMurdo station and the payloads for launch.
  - Three astrophysics LDB flights have been cancelled:
    - SPIDER (PI: W. Jones, Princeton) – CMB polarization
    - BACCUS (PI: A. Malinin, U. Maryland) – Cosmic-ray astrophysics
    - Super Pressure Balloon 100 day test flight (Balloon Program Office)
  - Three payloads are planned for next year creating a domino effect delaying other LDB payloads from flying.
- SOFIA cancelled 9 science flights with U.S. instruments.
  - Rescheduling FLITECAM commissioning will delay FOC milestone by 1 month.
- Assessments continue on impact of furlough on other research or operational activities.

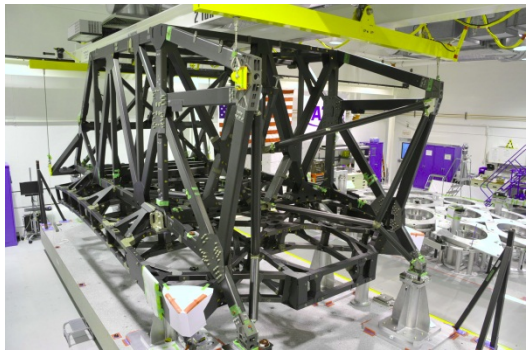
Program Update - JWST

Simplified Schedule



Program Update - JWST

- Telescope Optics
  - All optics are complete (primary segments, secondary, tertiary and fine steering mirrors).
  - 15 flight primary mirrors and the flight secondary mirror are at GSFC in storage.
  - All spares at GSFC in storage (secondary, 3 primary spares).
  - Gear motor refurbishment is ~85% complete, going smoothly.
  - All mirrors will be in storage at GSFC by end of year or early 2014, needed in 2015.
- Telescope Backplane
  - Wings are complete
  - Backplane Support Fixture (BSF) & Center Section (CS) assembled
  - BSF/CS undergoing cryo testing – Critical Path



Wings at XRCF

BSF/CS in the XRCF

Program Update - JWST

- Science Instruments
  - All instruments at GSFC!

Program Update - JWST

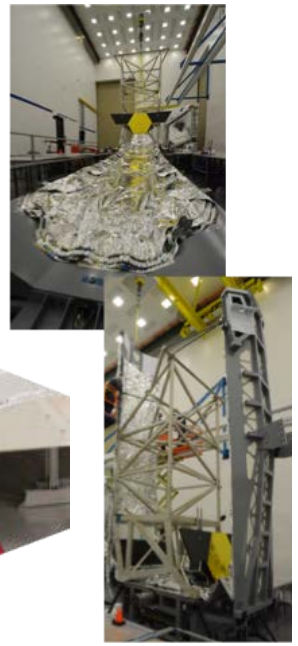
- Spacecraft
  - Completing reviews leading to spacecraft Critical Design Review


Spacecraft Mockup


Star Tracker Mockup


Primary Cone Structure

- Spacecraft Sunshield
  - All engineering layers complete
  - Flight Manufacturing Readiness Reviews underway

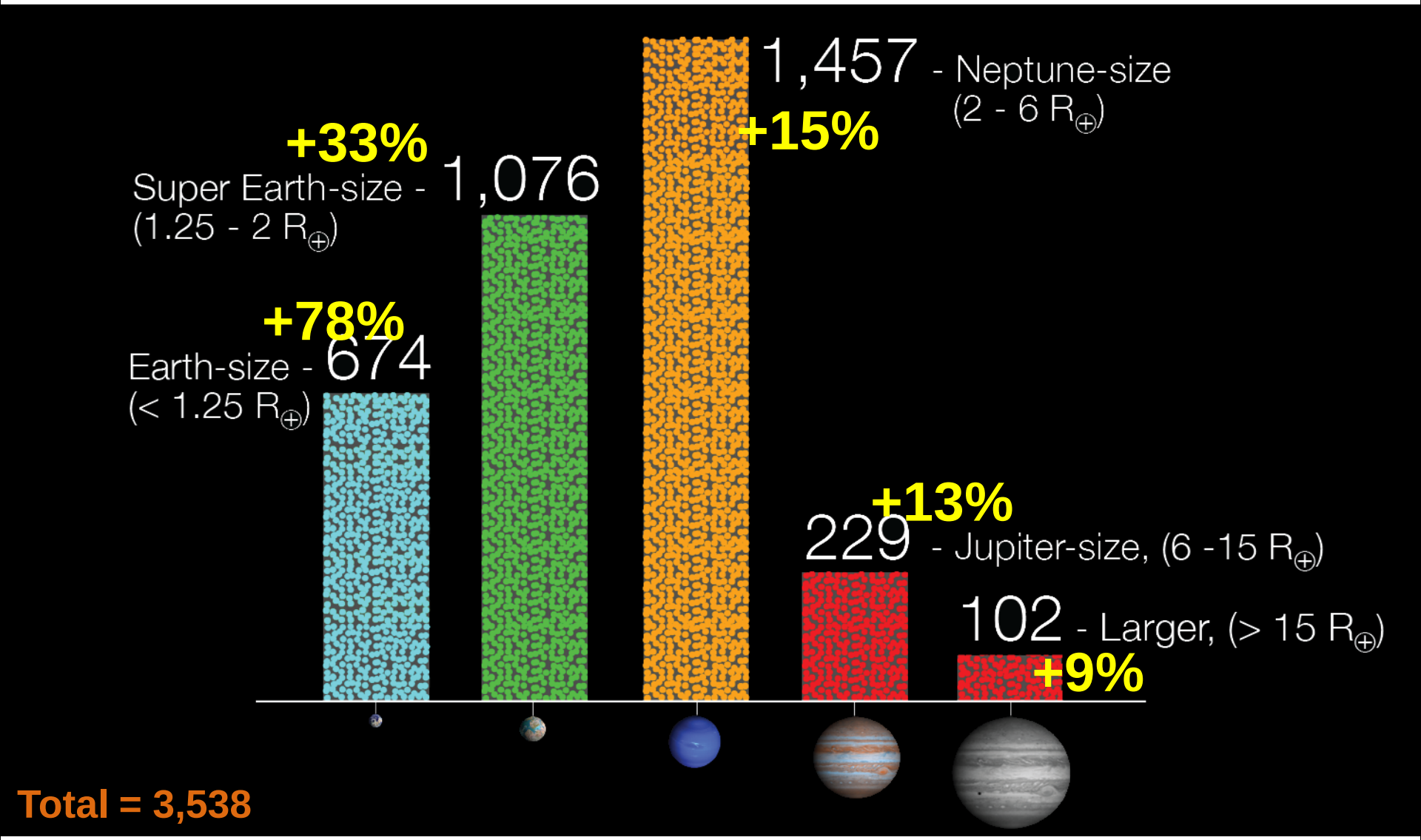


Program Update - JWST

- Program watch list
  - Low FY14 unencumbered Unallocated Future Expenses (UFE)
  - Project-held UFE consumption rate
  - Definitization of Northrop-Grumman contract modification
  - Cryocooler (schedule, technical, cost)
  - 3/4” Non Explosive Actuator used to release the telescope from stowed position on top of the spacecraft currently not meeting the shock requirement
  - Mid-infrared stray light
- Summary
  - Project has entered its long and challenging I&T activities
  - Technical progress continues to be significant
  - Instruments are either delivered or in ISIM Integration & Test phase, completed flight mirrors are arriving at GSFC
  - Project is performing within the budget, to schedule
  - FY14 is the peak funding year with many critical activities

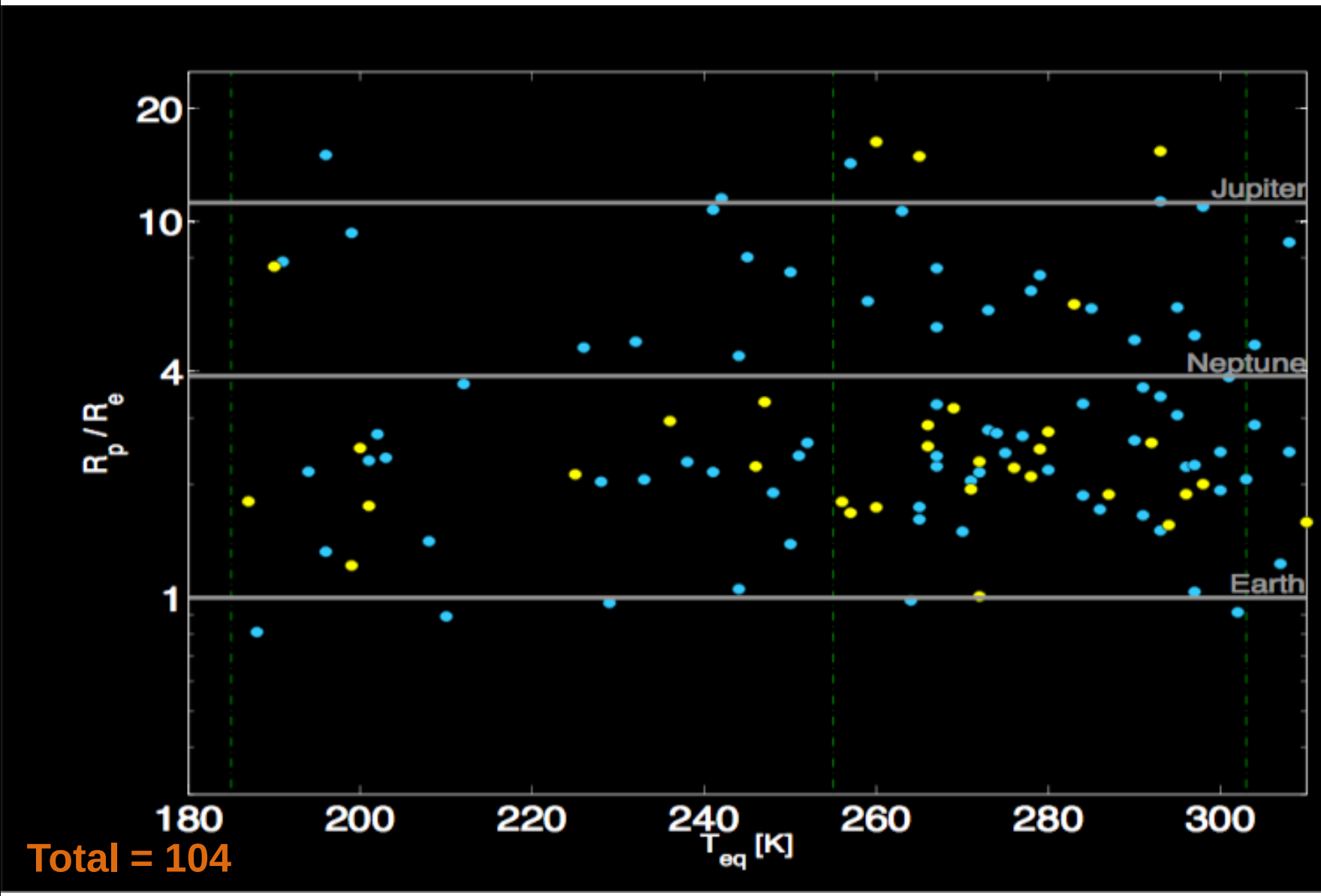
Sizes of Kepler Planet Candidates

Totals as of November 2013



Kepler Candidates in Habitable Zone

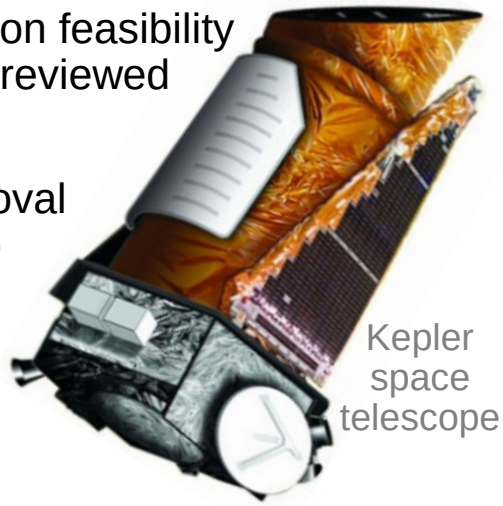
As of November 4, 2013



Total = 104

Program Update – Kepler

- The flight system is behaving nominally in Point-Rest-State.
- The Call for White Papers resulted in 42 submitted papers covering exoplanets, asteroseismology, open cluster studies, NEOs, and more.
- The preliminary results of the Kepler project's science recommendation was delivered to HQ in October; a final report is due in November.
- A series of engineering demonstrations of 2-wheel performance on the spacecraft was initiated.
- Kepler Science Conference held at NASA Ames Research Center from November 4 to 8, 2013.
- Path Forward
  - Mid-November - Due date for final report from Kepler project on feasibility of 2-wheel operations (K2). The report will be independently reviewed for both science and cost/technical feasibility.
  - Early December - Respond to Kepler project with either approval to continue working on Senior Review proposal or decision to terminate Kepler if 2-wheel operations are determined to be scientifically noncompetitive, technically infeasible, and/or cost prohibitive.



Kepler space telescope

Program Update – SOFIA

- SOFIA successfully completed all nine planned science flights for first southern hemisphere deployment.
  - SOFIA was based at the U.S. Antarctic Program's airfield in Christchurch, NZ, from July 12 to August 2, 2013.
- DSI signed DLR/DSI contract.
  - Revised scope of new contract could lead to NASA taking on additional responsibilities.

- SOFIA successfully observed a Hot Jupiter transit prior to shutdown.
- SOFIA impacted by the government shutdown October 1-16, 2013.
  - Nine science flights lost.
  - U.S. and German Cycle 2 selection announcements delayed.
- SOFIA successfully observed Comet ISON during first post-shutdown science flight.

- FOC (full operational capability) milestone will be reached when 4th instrument is commissioned.
  - FLITECAM cryostat being repaired.
  - FIFI-LS being completed and delivered.
  - Both will be commissioned in Spring 2014.
- Aiming for KDP-E (formal transition from development to operations) by early CY 2014.
- SOFIA will undergo heavy maintenance in Germany during Summer/Fall 2014.

NASA use of 2.4 m Telescope Assets for WFIRST

- Since Fall 2012, NASA has been studying potential uses of the 2.4 m telescope assets: (1) focused Astrophysics study (AFTA) and (2) an assessment of possible applications to other NASA objectives in science, technology, and human space flight.
- The focused astrophysics study showed that use of these telescope assets satisfy all mission requirements for WFIRST. For approximately the same costs, the telescope assets would enable a WFIRST mission with significantly improved science capabilities relative to the design described in the Astrophysics Decadal Survey.
  - AFTA's 2.4 m aperture + Wide Field Imager meets (and exceeds) WFIRST requirements:
    - ✓ Higher spatial resolution enhances science capability.
    - ✓ Larger collecting area enables more science in fixed time.
  - Use of the telescope assets would also enable the addition of an exoplanet imaging instrument to WFIRST that would enable imaging and characterization of planets around nearby stars up to a decade earlier than contemplated in the Decadal Survey; AFTA's 2.4 m aperture enables richer scientific return at much lower cost than a dedicated smaller coronagraphic telescope mission.
- The Administrator directed the Science Mission Directorate to continue pre-formulation activities for a mission using the 2.4 m telescope assets to prepare for a later decision as to whether a WFIRST mission would be undertaken with these optics.
- No decision on a future wide field infrared survey mission is expected until early 2016.
- There was no decision to proceed with design studies for any other concepts at this time.

AFTA Study: Near-Term Activities

- SDT is reconvened with new charter and additional members.
  - Co-Chairs are David Spergel (Princeton) and Neil Gehrels (GSFC).
- NASA requesting a NRC study in late 2013/early 2014 to assess AFTA design reference mission against Decadal Survey recommendations for WFIRST and New Worlds technology.
- APD down-selects to 2 coronagraph technologies for further development – decision by December 2013.
  - SDT delivered coronagraph science drivers analysis in early October 2013.
  - ExEP Program Office and AFTA Study Office coronagraph technology downselect recommendations due to APD December 2013.
- No decision on a mission will be made before early 2016.
  - Interim report by SDT and project due by April 2014.
  - Final report by SDT and project due by January 31, 2015.
  - CATE due February 27, 2015.
- NASA will request a study by the NRC in early CY 2016 of all SDT reports in context of Decadal Survey recommendations.

ESA's L2 and L3 Missions

- NASA has expressed a strong interest to ESA in contributing to ESA's next large astrophysics missions if they are responsive to the US Decadal Survey.
- ESA process identified five finalist themes following a January public workshop in Paris.
  - Gravitational universe
  - Hot and energetic universe
  - Habitable worlds beyond the solar system
  - Microwave and FIR polarimetric spectroimaging of the sky
  - Science at the icy giants
- Decision expected at meeting of the ESA Science Programme Committee on Nov 28-29.

Ft. Sumner Balloon Campaign

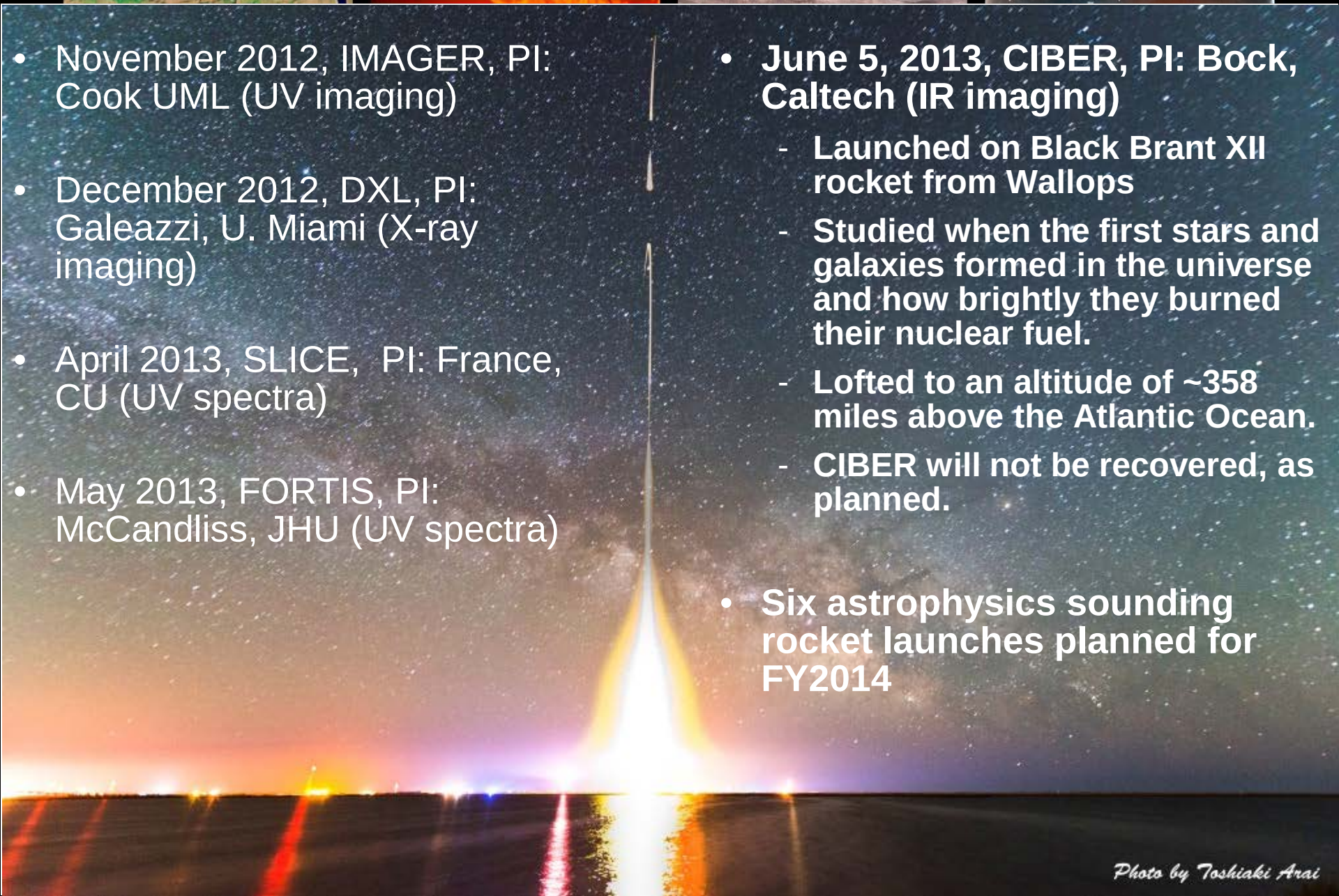
- **HASP student experiment platform flew September 2-3.**
  - Flight lasted ~12 hours with 9 of 10 student payloads being flown successfully.
- **HEROES (High Energy Replicated Optics to Explore the Sun) flew September 21-22.**
  - X-ray telescope that offers improved observations of solar flares and other astrophysical objects.
  - Flight lasted ~25 hours with nominal science operations.
- **BRRISON flew September 28.**
  - Observations of comet ISON and its emission rates of water and CO2.
  - Payload anomaly occurred shortly after launch; no science data obtained.
- **WASP/HySICS flew September 29.**
  - Tests high-accuracy pointing developed at WFF; HySICS improves accuracy of solar spectral irradiance observations for climate measurements.
  - Flight lasted ~8 hours with nominal science operations.
- **X-Calibur**
  - Measures energy of cosmic X-rays, providing insights into accretion disks of stellar mass black holes.
  - Due to reduced flight time and lingering technical issues decision made not to fly payload during this campaign.

HASP Launch

HySICS
(Credit: LASP)

FY2013 APD Sounding Rocket Launches

- November 2012, IMAGER, PI: Cook UML (UV imaging)
- December 2012, DXL, PI: Galeazzi, U. Miami (X-ray imaging)
- April 2013, SLICE, PI: France, CU (UV spectra)
- May 2013, FORTIS, PI: McCandliss, JHU (UV spectra)
- **June 5, 2013, CIBER, PI: Bock, Caltech (IR imaging)**
  - **Launched on Black Brant XII rocket from Wallops**
  - **Studied when the first stars and galaxies formed in the universe and how brightly they burned their nuclear fuel.**
  - **Lofted to an altitude of ~358 miles above the Atlantic Ocean.**
  - **CIBER will not be recovered, as planned.**
- **Six astrophysics sounding rocket launches planned for FY2014**



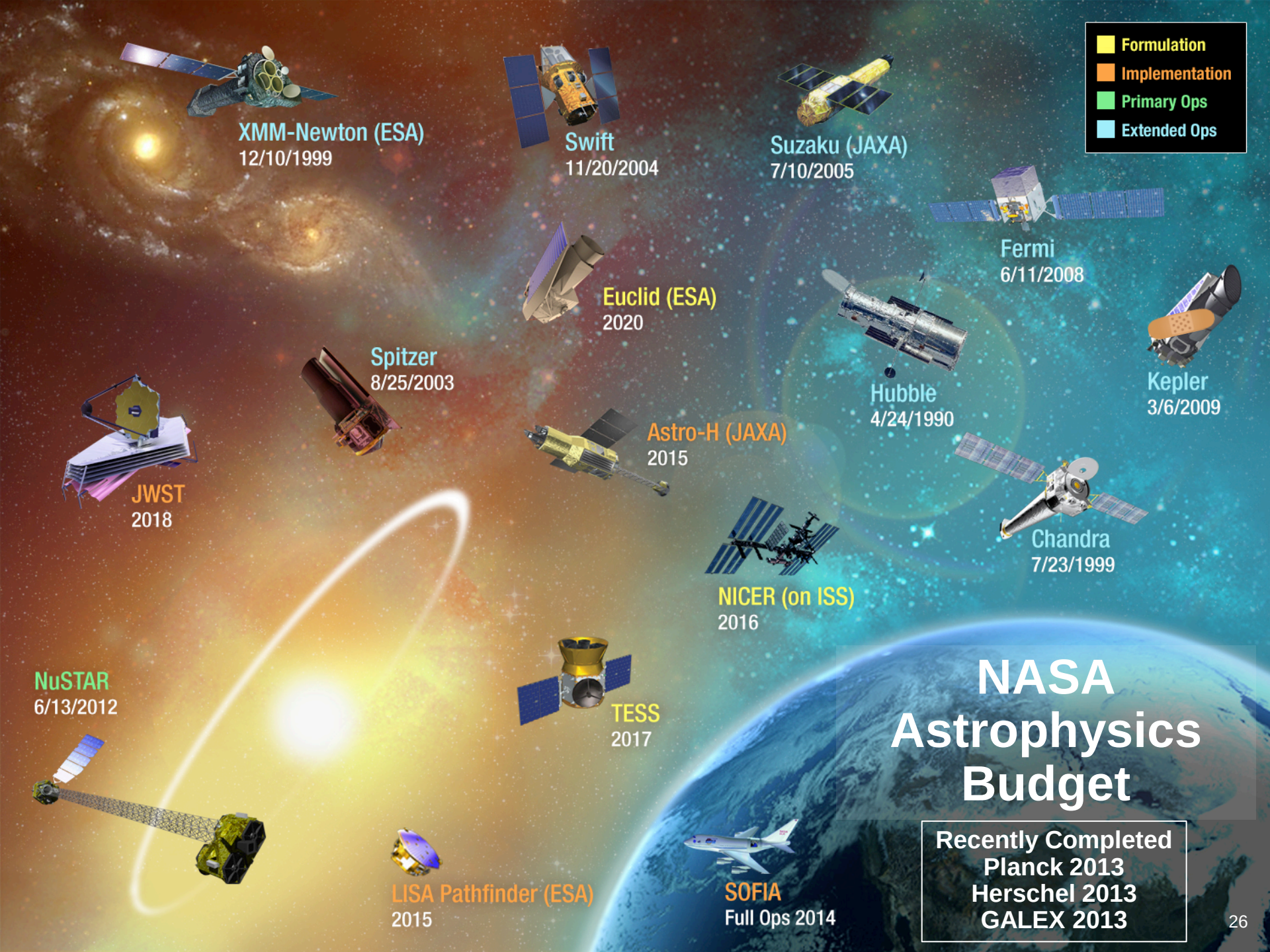
Proposal Selections Since January 2013

Status: November 8, 2013

	Proposal Due Date	Notify Date	Days since received	Number received	Number selected	% selected
Roman Tech Fellowships	Nov 8	Mar 5	117	12	2	17%
Fermi GI Cycle 6	Jan 18	May 16	118	233	50	21%
Kepler GO Cycle 5	Jan 18	April 15	87	63	25	40%
TCAN with NSF	Feb 14	June 20	126	106	20*	19%
Kepler Participating Sci.	Mar 1	July 5	126	30	11	37%
Hubble GO Cycle 21	Mar 1	May 30	90	1094	249	23%
Chandra GO Cycle 15	Mar 14	July 12	120	636	179	30%
APRA (basic research)	Mar 22	Sep 11	173	178	23	13%
SAT (technology)	Mar 22	Sep 13	175	38	5	13%
ADAP (data analysis)	May 17	Oct 30	166	276	33	12%
Origins of Solar Sys.	May 23	Nov 6	167	41	5	13%
SOFIA GO Cycle 2^{+}	Jun 28	Oct 31	125	112	35	31%
ATP (theory)	Jul 12		[119]	182		**
Spitzer GO Cycle 10^{+}	Aug 2	Oct 22	81	137	38	28%
Swift GI Cycle 10	Sep 26		[43]	174		**

* Includes 10 NSF TCAN proposal selections.

** ROSES-13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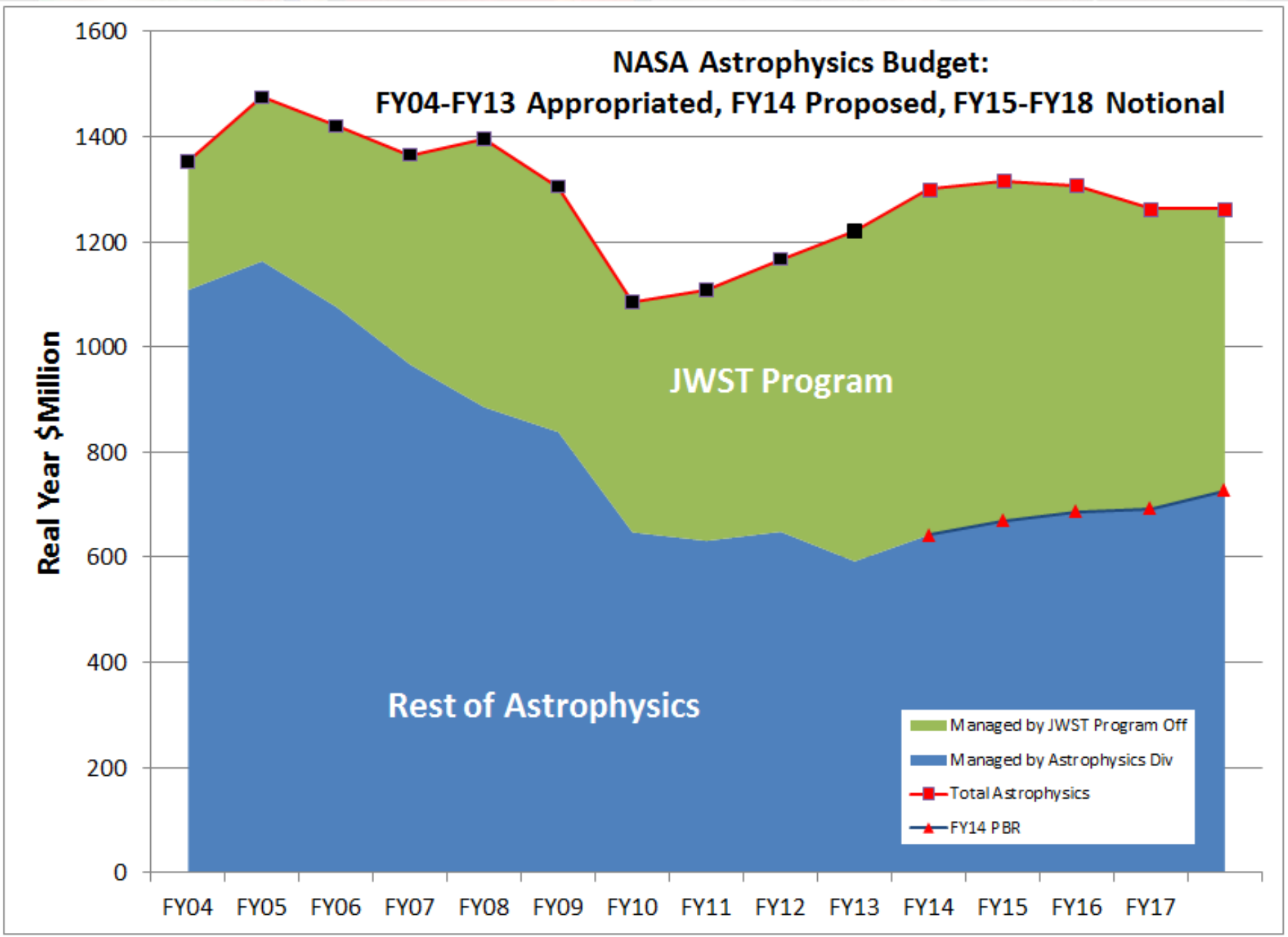

NASA Astrophysics Budget:
FY04-FY13 Appropriated, FY14 Proposed, FY15-FY18 Notional
Real Year $Million
1600
1400
1200
1000
800
600
400
200
0
JWST Program
Rest of Astrophysics
Managed by JWST Program Off
Managed by Astrophysics Div
Total Astrophysics
FY14 PBR
FY04
FY05
FY06
FY07
FY08
FY09
FY10
FY11
FY12
FY13
FY14
FY15
FY16
FY17

FY13 Appropriation

- Congress appropriated $659M for Astrophysics & $628M for JWST.
  - Astrophysics appropriation total matches request but includes $10M earmarked for WFIRST.
  - JWST appropriation is what was requested.
  - Rescission (~1.8%), Sequestration (~5%), and other budget adjustments resulted in an FY13 Astrophysics budget significantly lower.
  - Astrophysics ended at $617M & JWST ended at $628M for FY13.
  - Includes $7M for AFTA studies.
- Astrophysics made reductions totaling $42M (6.4%) in the following areas.
  - Reduced carry-over for operating missions, includes rephasing of GO funds.
  - Rephased unneeded FY13 reserves for developing missions.
  - Rephased R&A funding until FY14 for some PIs, reduced selections.
  - Slowed down development of current and future Explorers.
  - Postponed needed upgrades in infrastructure programs.
  - Downstream impacts include.
    - Lowered R&A selection rates in 2013 (for FY14 funding).
    - Delays in future Explorer AOs.
    - Other reductions in FY14 where funding requirements were deferred.

FY13 Appropriation – R&A impacts

- Sequestration and other changes in the APD planning budget have an impact on Research and Analysis programs
- Sequestration of funding in FY13 has been handled, in part, by making fewer selections for new awards requiring FY13 funding and by delaying funding until FY14 for those continuing PIs who indicate there is little or no impact
  - Delayed finalization of FY13 budget means some new awards cannot be started in FY13 and will be deferred to FY14
- Some specific impacts of FY13 sequestration and other known changes
  - ATP-12 and OSS-12 have fewer selections (requires FY13 funding)
  - ATP-12 and OSS-12 have some new funding starts delayed until FY14
  - TCAN-12 has all new funding starts delayed until FY14

FY14 Budget Request

- President requested $642M for Astrophysics and $658M for JWST.
  - Request includes full funding required for JWST; new projects for TESS, NICER, Euclid; mission extensions per 2012 Senior Review; core funding for research and suborbital projects; planning budget wedge for strategic mission starting in FY17.
  - Request includes no funding for E/PO.
- Continuing resolution through January 15, 2014, is at FY13 post-sequestration level.
  - JWST is prioritized by NASA and will receive the funding required to maintain progress toward a 2018 LRD per the new baseline plan.
  - Exact allocation of funding during a CR is driven by immediate project funding requirements.
  - If Divisions funded at same relative amounts as FY14 President's budget request, then Astrophysics annualized funding level under the CR is $607M.
- Absent a budget agreement, NASA's budget will be sequestered in January 2014.
  - House appropriations committee recommended $623M for Astrophysics and $584M for JWST in FY14
  - Senate appropriations committee recommended $678M for Astrophysics and $658 for JWST.

Distribution of FY14 Budget Request

	% of FY14 PBR	Total $628.4M (excludes $13.9M SMD admin account)
R&A program elements	13.2%	includes APRA, OSS, ATP, ADAP, RTF, TCAN
Research infrastructure	10.2%	includes balloon program, Keck, LBTI, archives, astrobiology
Einstein, Hubble, Sagan Fellowships	2.2%	
Operating missions (including GO programs)	Total 36.2% Hubble 15.3% Chandra 8.7% Kepler 3.0% Spitzer 2.6% Fermi 2.3% Others 4.4%	prioritized by Senior Review “others” includes Herschel, NuSTAR, Planck, Swift, Suzaku, XMM-Newton GO funding is 9.6%
SOFIA	13.9%	
Explorer missions in development	12.8%	includes ASTRO-H, NICER, TESS
Strategic missions in development	2.9%	includes Euclid, ST-7
Future Explorer missions	0.0%	no funding until next AO selection
Pre-formulation of WFIRST/AFTA	2.1%	including technology development for detectors and coronagraph
Strategic Astrophysics Technology	3.3%	directed, competed, and testbeds
Other strategic studies	0.7%	includes exoplanet probes, X-ray probe
Program management	2.6%	

Astrophysics Missions timeline

Last updated: April 15, 2013

Decadal Survey Mission

EX/MO (AO NET 2016)

SMEX/MO (AO NET 2014)

Euclid (ESA) — Launch in 2020

JWST (ESA, CSA) — Launch in 2018

TESS — Launch in 2017

NICER — Launch in 2016

ASTRO-H (JAXA) — Launch in 2015

ISS-CREAM (Sth Korea) — Launch in 2014

ST-7/LPF (ESA) — Launch in 2015

NuSTAR (ASI, Denmark)

SOFIA (DLR)

Herschel (ESA, UK, Netherlands) — Herschel cryogen depleted in April 2013

Planck (ASI, CNES, UK, ESA) — Planck mission completed in October 2013

Kepler

Fermi (DOE, Intl team)

Suzaku (JAXA)

Swift (ASI, UK)

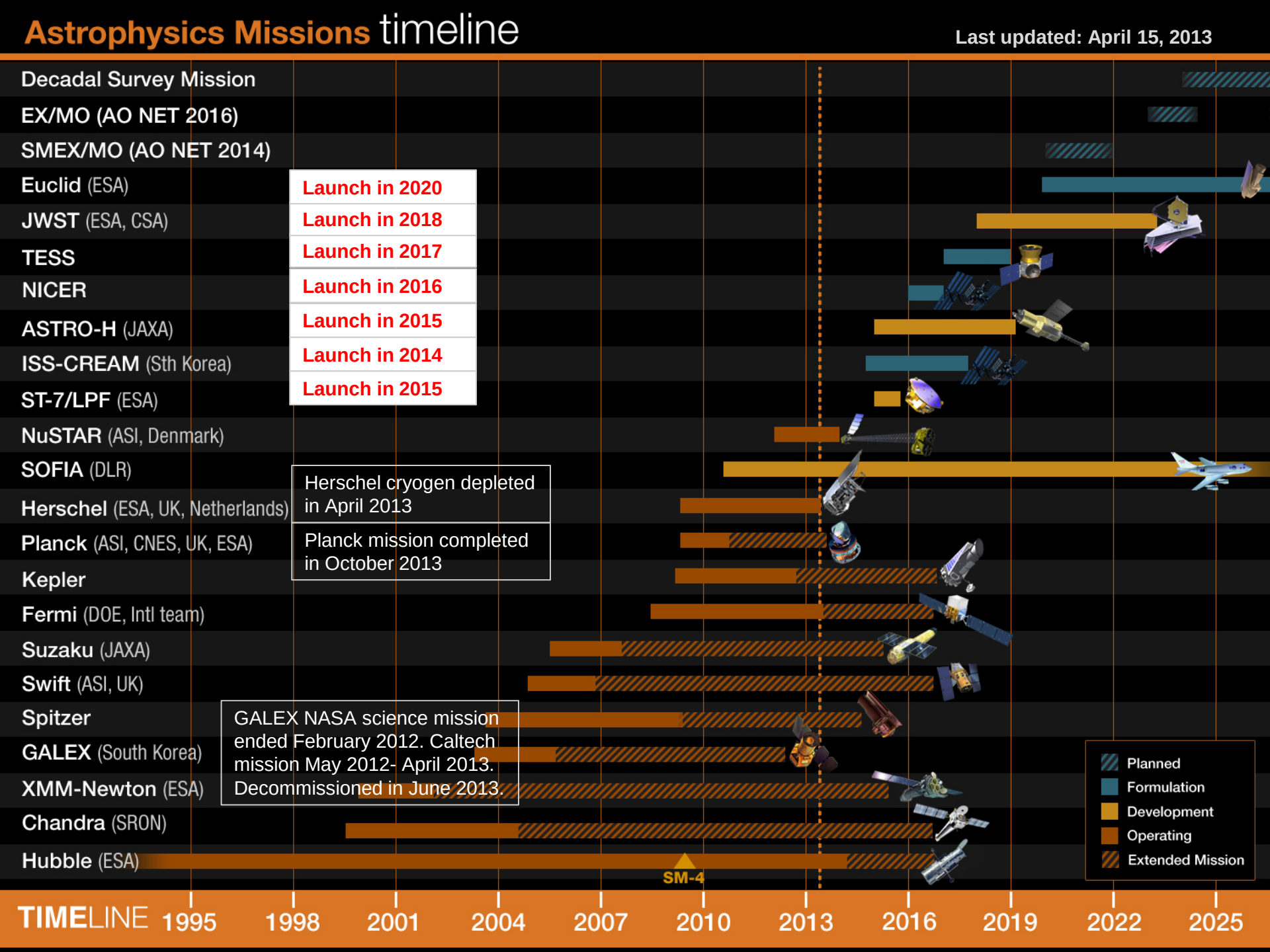
Spitzer

GALEX (South Korea) — GALEX NASA science mission ended February 2012. Caltech mission May 2012- April 2013. Decommissioned in June 2013.

XMM-Newton (ESA)

Chandra (SRON)

Hubble (ESA) — SM-4



Planned
Formulation
Development
Operating
Extended Mission

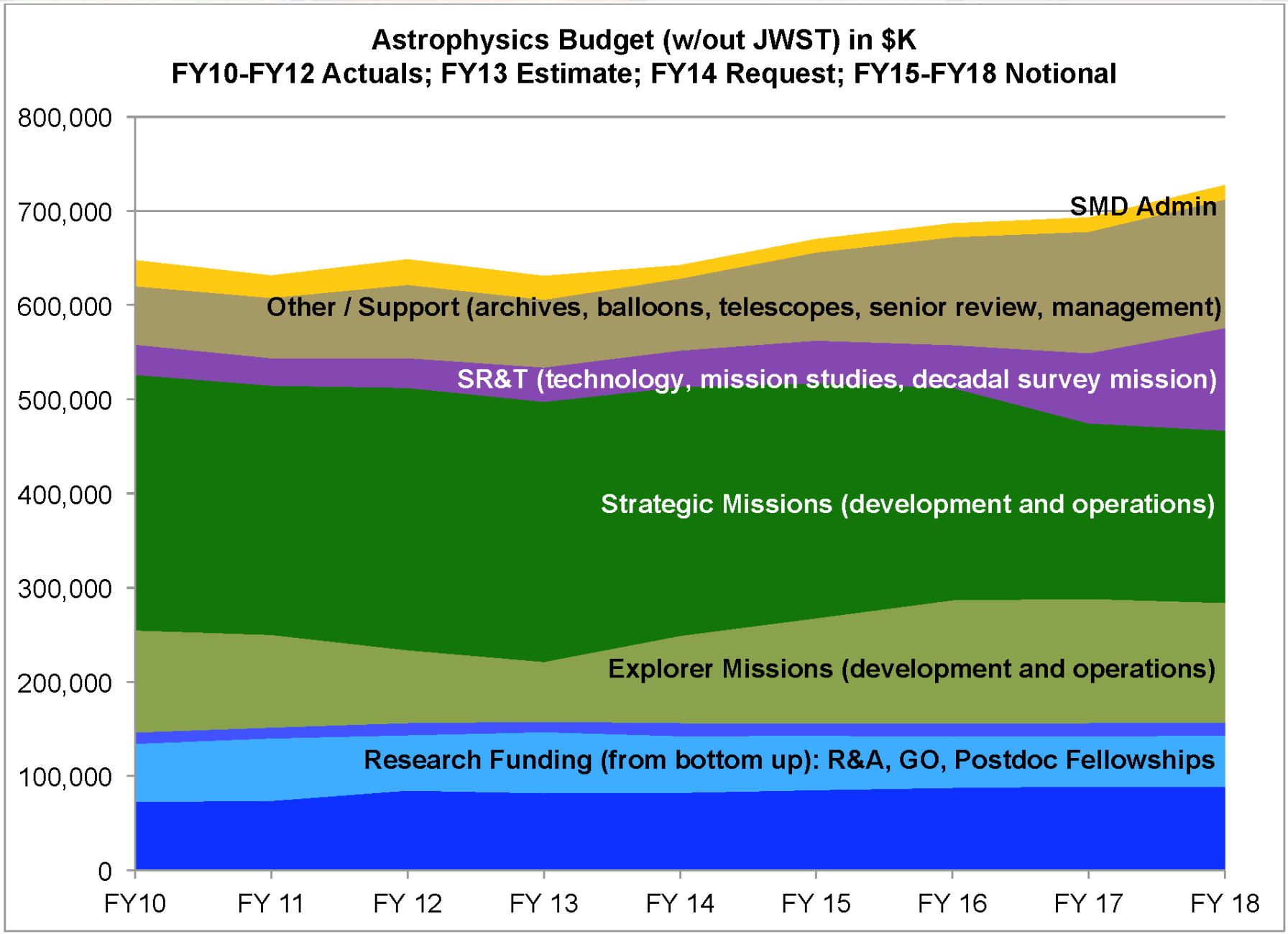
TIMELINE 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025

Backup

Astrophysics Decadal Survey - Summary

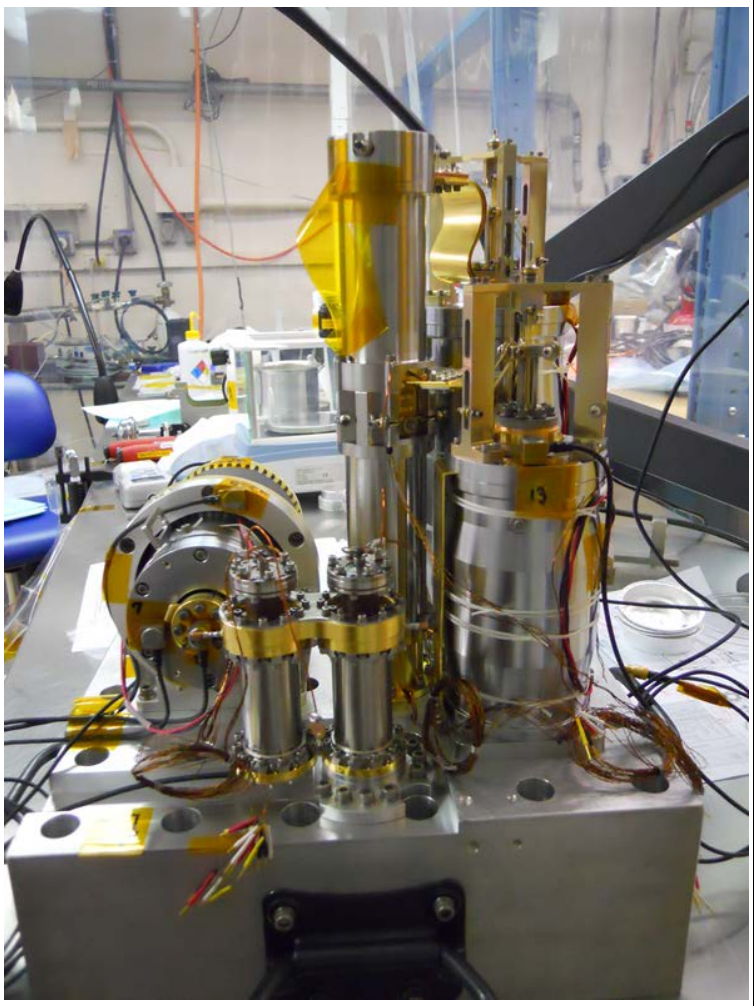
Program Scale	Recommendation	Response supported by FY14 President's Budget Request
Large	**WFIRST**	DRM1 and DRM2 completed in FY12; AFTA "proof of concept" DRM completed in FY13; pre-formulation and technology development (detector and coronagraph) in FY14-FY19; prepared for decision regarding new start in FY15; participating in ESA's Euclid
Large	**Explorer** Augmentation	Impacted by sequestration and budget reductions including cancellation of selections from FY12 MO AO; EX AO in FY11; SMEX AO NET 2014; EX AO NET 2016; each AO has a mission and a MO
Large	**LISA** Technology	CST completed in FY12; technology supported through SAT; ST-7/LPF supported; will pursue partnership with ESA if a GW mission is selected for L2/L3 mission
Large	**IXO** Technology	CST completed in FY12; technology supported through SAT; X-ray probe STDT starting in FY14; will pursue partnership with ESA if an X-ray mission is selected for L2/L3 mission
Medium	**New Worlds Technology**	Technology supported through APRA and SAT(TDEM); exoplanet probe STDTs started in FY13; AFTA coronagraph study completed in FY13; AFTA coronagraph technology starting in FY14; will consider partnership with ESA if an exoplanet mission is selected for L2/L3 mission
Medium	**Inflation Probe Technology**	Technology supported through APRA and SAT including multiple suborbital payloads; will consider partnership with ESA if a CMB mission is selected for L2/L3 mission
Small	**Astrophysics Theory Program** Augmentation	Impacted by sequestration and budget reductions
Small	(Definition of) a **future UV-optical space capability**	RFI in FY12; follow-on workshops FY14-FY16; technology supported through APRA, SAT, and working with STMD
Small	**Intermediate Technology Development** Augmentation	SAT program initiated in FY11 and funded for prioritized investments; funding directed toward decadal survey priorities including AFTA, probes, New Worlds, and ESA L2/L3 technologies; impacted by sequestration and budget reductions
Small	**Laboratory Astrophysics** Augmentation	Augmentation started in FY12 including selection of large consortium; future selections impacted by sequestration and budget reductions
Small	**SPICA** mission (U.S. contributions to JAXA-led)	Candidate for future Explorer Mission of Opportunity
Small	**Suborbital Program** Augmentation	Technology augmentation for balloon program; continued development of ULDB balloon platforms; ISS payload selections; impacted by sequestration and budget reductions
Small	**Theory and Computation Networks** (NASA, NSF, DOE)	Six networks competitively selected in 2013 and funded by NSF and NASA in FY14-FY16
N/A	**Additional core program augmentations**	Includes basic research and technology development, mission extensions, data analysis, N.G. Roman Technology Fellowships; impacted by sequestration and budget reductions

Astrophysics Balance (w/out JWST)



Program Update - Astro-H

- The JAXA Engineering Model dewar tests conducted in September with a cryocooler modified to reduce vibration.
  - Continued tests with dewar to achieve expected noise improvement.
  - Tests with breadboard isolators under two original cryocoolers demonstrate complete noise elimination.
- Project impacted by the government shutdown. Lost time impacting the delivery date to JAXA.
  - Project now planning to deliver the Flight Model calorimeter science insert (CSI) April 2014, includes a ~5 week slip due to government shutdown.
  - Soft X-ray Telescope Mirrors delivery moved to mid-November.
- SMD Program Management Council review scheduled for November 14, 2014, to formally change cost commitment for Astro-H project



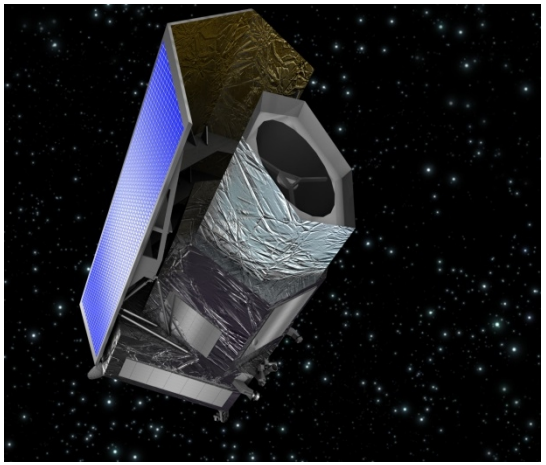
Flight ADR has successfully passed the warm vibration workmanship test.

Program Update – Euclid

- **Project successfully completed KDP-C on September 13, 2013 - received approval to enter Phase C.**
  - Commitment includes delivery of flight and spare sensor chip subsystems (sensor chip assembly, sensor chip electronics, cryogenic flexible cabling) plus science team.
  - Decision on NASA Euclid Science Center deferred until the release of the NASA FY 2015 budget.
- All of the Euclid NRE sensor chip assemblies have been produced and more than 3 detectors met requirements to be called Grade 1.
- No impacts from government shutdown at JPL since they continued to work.

Upcoming Key Date:

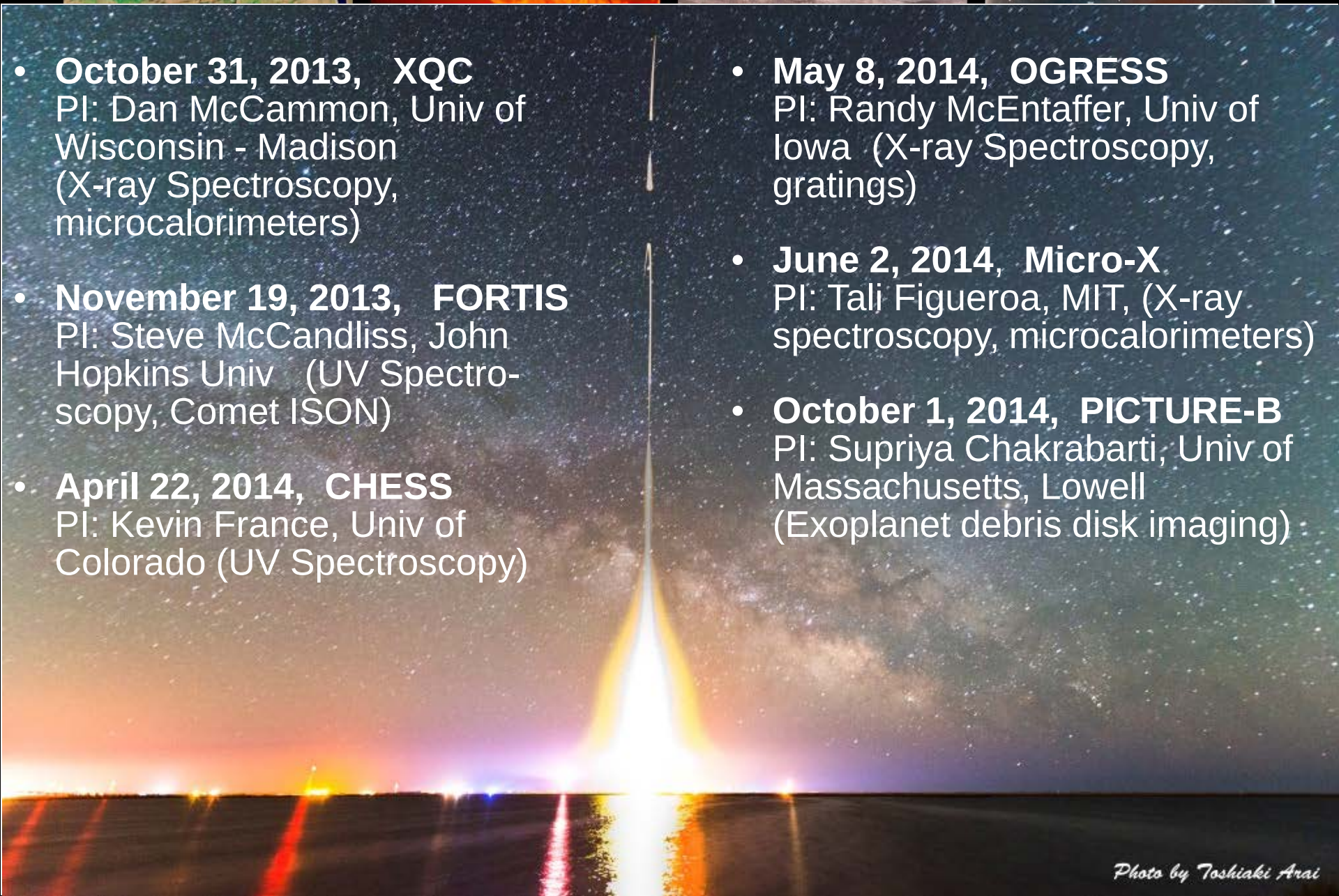
- November: JPL signs contract with Teledyne for hardware.



Euclid

FY2014 APD Sounding Rocket Launches

- **October 31, 2013, XQC**
  PI: Dan McCammon, Univ of Wisconsin - Madison (X-ray Spectroscopy, microcalorimeters)
- **November 19, 2013, FORTIS**
  PI: Steve McCandliss, John Hopkins Univ (UV Spectro-scopy, Comet ISON)
- **April 22, 2014, CHESS**
  PI: Kevin France, Univ of Colorado (UV Spectroscopy)
- **May 8, 2014, OGRESS**
  PI: Randy McEntaffer, Univ of Iowa (X-ray Spectroscopy, gratings)
- **June 2, 2014, Micro-X**
  PI: Tali Figueroa, MIT, (X-ray spectroscopy, microcalorimeters)
- **October 1, 2014, PICTURE-B**
  PI: Supriya Chakrabarti, Univ of Massachusetts, Lowell (Exoplanet debris disk imaging)



AFTA Study: Strawman Payload & SDT Findings

2.4m Telescope with wide field-of-view

Wide-Field Instrument

- *Imaging & spectroscopy over 1000s sq deg.*
- *Monitoring of SNe and microlensing fields*
- 0.7 – 2.0 micron bandpass
- 0.28 sq deg FoV (100x JWST FoV)
- 4 filter imaging, grism + IFU spectroscopy
- 18 H4RG detectors (288 Mpixels)

Requires focused tech. development

Coronagraph (study option)

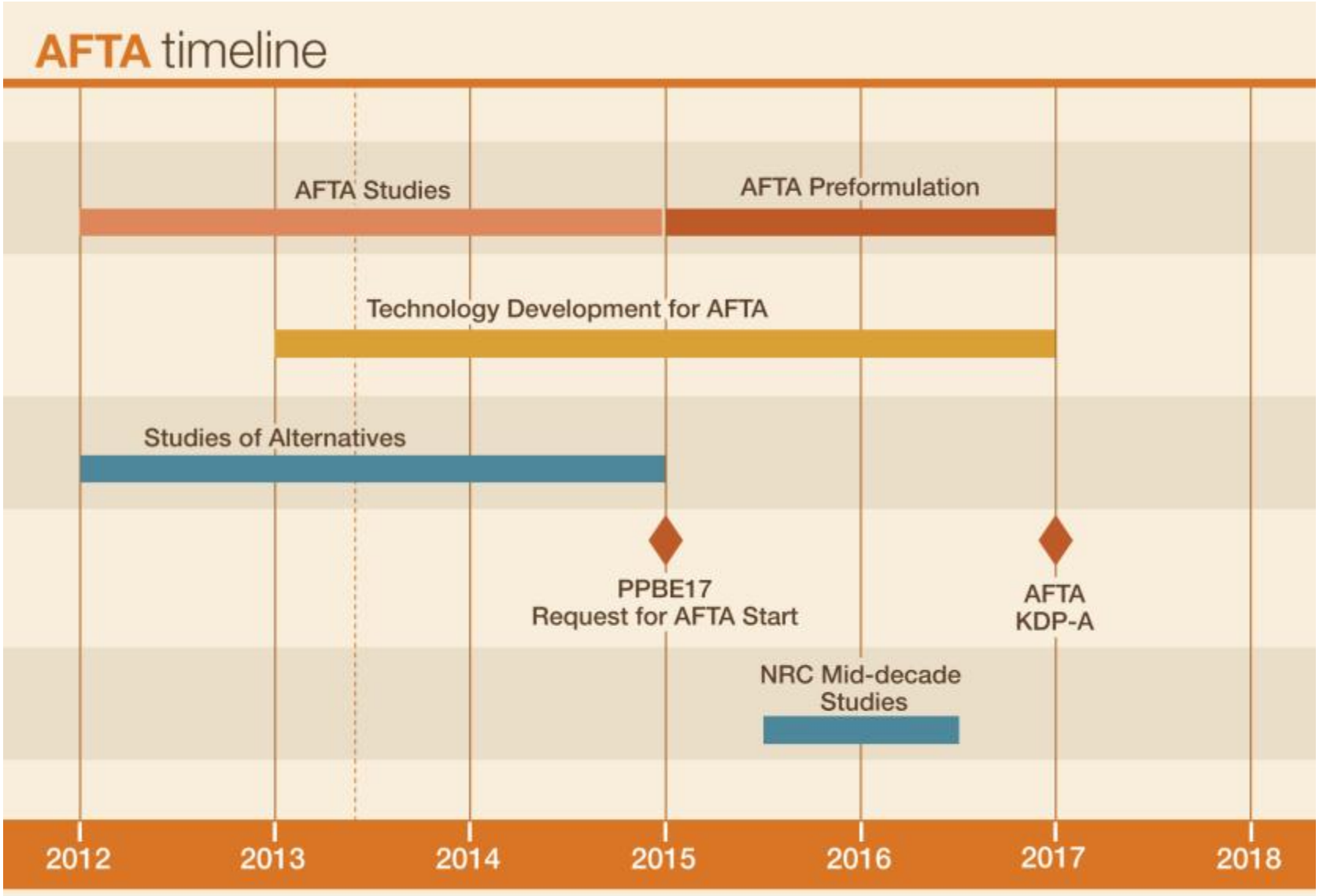
- *Imaging of ice & gas giant exoplanets*
- *Imaging of debris disks*
- 400 – 1000 nm bandpass
- 10^{-9} contrast
- 100 milliarcsec inner working angle at 400 nm

Requires focused tech. development

Findings of SDT

- AFTA carries out the WFIRST science program (the top ranked decadal priority).
- AFTA's larger aperture enables astronomers to make important contributions towards many of the enduring questions listed in the decadal survey through both surveys and peer-reviewed observing programs.
- Equipped with a coronagraph, AFTA can image Jupiter and Saturn-like planets around the nearest stars. AFTA will be an essential stepping stone towards finding signs of life around nearby stars.

Plan for AFTA Preformulation



Astrophysics Senior Review in 2014

- Astrophysics will conduct a Senior Review for Operating Missions (in conformity with PL 109-155, § 304(a)).
  - Coordinated calls for Hubble, Chandra, and the remainder of the MO&DA portfolio to be held in the March 2014 timeframe.
  - Missions will be required to submit self-identified science objectives as well as budgets, FTE/WYE levels, and assessment against prior SR proposal.
  - All missions will be comparatively assessed by a single Senior Review Panel with the exception of the Hubble Space Telescope and the Chandra X-ray Observatory. The Hubble Space Telescope and the Chandra X-ray Observatory will be reviewed during this timeframe in self-contained separate, but similar reviews, by individualized Senior Review Panels.
- Astrophysics will conduct a Senior Review for Operating Missions.
  - Final Call for Proposals issued: November 15, 2013
  - Senior Review Proposals due: January 31, 2014
  - Senior Review panel meets: late March/ early April 2014
  - Panel's report & APD response: June 2014
- Missions invited.
  - Hubble, Chandra
  - Fermi, NuSTAR, Spitzer, Suzaku, Swift, XMM-Newton, possibly Kepler (K2)
  - Planck, WISE (MaxWISE)

Education and Public Outreach

- NASA will conduct E/PO in FY14.
  - During the period of the continuing resolution (CR), SMD projects are directed to continue planned EPO activities at the same level of effort and budget as during FY13, except where decreases were already planned.
- Astrophysics projects will replan E/PO for FY14 during the CR.
  - It is anticipated that programs and projects will continue to execute approved FY14 E/PO plans during FY14 beyond the CR.
  - There is no augmentation expected for the parent program or project above the FY14 budget guidelines. Carry over funds from FY13 may be used for approved FY14 E/PO activities. The project may propose to reprogram non-E/PO FY14 funds to enable approved FY14 E/PO activities.
  - Projects are directed to submit a description of their proposal to continue or change their approved FY14 E/PO plans.

Reference: SMD memo 9/18/13; Astrophysics memo 9/20/13

Astrophysics Division

September 19, 2013

Resource Management
Omana Cawthon +
Clemencia Gallegos-Kelly +

Director
Paul Hertz

Deputy Director
Andrea Razzaghi

Lead Secretary: Kelly Johnson
Secretary: Leslie Allen
Program Support Specialist: Sheila Gorham

Cross Cutting

Technology Lead: William (Billy) Lightsey *
Division E/PO POC: Hashima Hasan (Lead Comm Team)
Division Public Affairs POC: Lisa Wainio *
Information Manager: Lisa Wainio *

Astrophysics Research

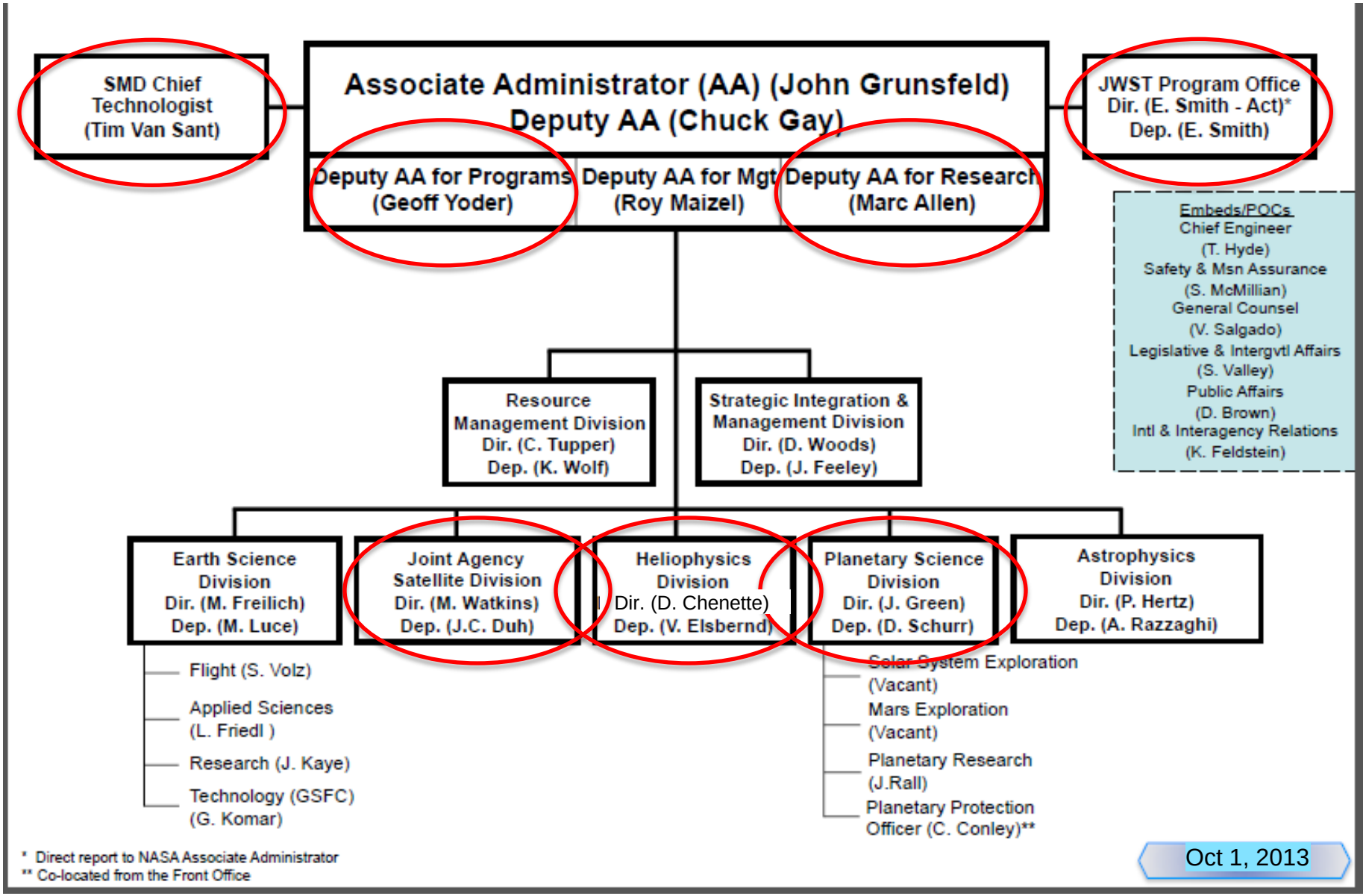
Program Manager: Linda Sparke
Program Support: Janet Larson *
Astrophysics Data Analysis: Doug Hudgins, Debra Wallace *
Astrophysics Theory: Keith MacGregor *
Origins of Solar Systems: Larry Petro*, Mario Perez *
APRA lead: Michael Garcia *
Cosmic Rays, Fundamental Physics: Vernon Jones, Keith MacGregor *
Gamma Ray/X-ray: Michael Garcia *
Lou Kaluzienski, Rita Sambruna, Wilt Sanders*
Optical/Ultraviolet: Michael Garcia *, Hashima Hasan, Mario Perez *
IR/Submillimeter/Radio: Dominic Benford *, Doug Hudgins, Larry Petro *, Eric Tollestrup *, Glenn Wahlgren*
Lab Astro: Glenn Wahlgren*
Data Archives: Hashima Hasan
Astrophysics POC for Sounding Rockets: Wilt Sanders *
Balloons Program: Vernon Jones (PS), Mark Sistilli (PE)

Programs / Missions

	Program Scientist	*Program Executive*
Exoplanet Exploration (EXEP)		
Program	**Doug Hudgins**	**Tony Carro ***
Keck	Hashima Hasan	Mario Perez *
Kepler	Doug Hudgins	Tony Carro *
LBTI	Hashima Hasan	Mario Perez *
NExScI	Hashima Hasan	Mario Perez *
Cosmic Origins (COR)		
Program	**Michael Garcia ***	**John Gagosian**
Herschel	Glenn Wahlgren *	John Gagosian
Hubble	Michael Garcia *	John Gagosian
JWST	Hashima Hasan	N/A
SOFIA	Glenn Wahlgren *	John Gagosian
Spitzer	Glenn Wahlgren *	Jeff Hayes *
Physics of the Cosmos (PCOS)		
Program	**Rita Sambruna**	**Lia LaPiana**
Chandra	Wilt Sanders *	Lia LaPiana
Euclid	Linda Sparke	Lia LaPiana
Fermi	Keith MacGregor *	Lia LaPiana
Planck	Rita Sambruna	Lia LaPiana
ST-7/LPF	Wilt Sanders *	Lia LaPiana
XMM-Newton	Lou Kaluzienski	Lia LaPiana
Astrophysics Explorers (APEX)		
Program	**Wilt Sanders ***	**Mark Sistilli**
ASTRO-H	Lou Kaluzienski	Jeanne Davis*
NICER	Rita Sambruna	Jeanne Davis *
NuSTAR	Lou Kaluzienski	Jeff Hayes *
Suzaku	Lou Kaluzienski	Jeff Hayes *
Swift	Michael Garcia *	Jeff Hayes *
TESS	Doug Hudgins	Mark Sistilli
WISE	Hashima Hasan	Jeff Hayes *
AFTA Study	Dominic Benford *	Lia LaPiana

\+ *Member of the Resources Mgmt Division*
* *Detailee, IPA, or contractor*
JWST now part of the JWST Program Office.

SMD Organization



Astrophysics Division Personnel Changes

Personnel who have recently left:

- Joan Centrella
- Richard Griffiths
- Anne-Marie Novo-Gradac

Personnel who have recently arrived:

- Dominic Benford
- Jeanne Davis
- Stefan Immler
- Rita Sambruna
- Eric Tollestrup

Community Participation

PhysPAG

- Executive Cmte: 7 members
- SAGs: 5 Active
- Chair: John Nousek
- Website: http://pcos.gsfc.nasa.gov/physpag

COPAG

- Executive Cmte: 9 members
- SAGs: 5 Active
- Chair: Ken Sembach
- Website: http://cor.gsfc.nasa.gov/copag

ExoPAG

- Executive Cmte: 10 members
- SAGs: 3 Active
- Chair: Scott Gaudi
- Website: http://exep.jpl.nasa.gov/exopag

Science and Technology Definition Teams (STDTs) in Progress:

- AFTA use of telescope assets: 20 members
- Exoplanet Probe with Internal Coronagraph: 10 members
- Exoplanet Probe with External Occulter: 10 members
- X-ray Astrophysics Probe: 14 members

Preliminary reports from the studies are due Spring 2014.
Final reports from the studies are due in January 2015.

Advisory Committees (and November meetings)**:**

- NRC Committee on Astronomy and Astrophysics (CAA): Nov 4-5
- Astronomy and Astrophysics Advisory Committee (AAAC): Nov 13-14
- NASA Advisory Council's Astrophysics Subcommittee (APS): Nov 19 (telecon)