



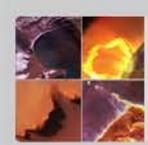
# Astrophysics

**Physics of the Cosmos Program  
Analysis Group (PhysPAG)**

**Paul Hertz**

**Director, Astrophysics Division**

**August 15, 2012**



# Astrophysics Budget Reality

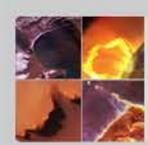
- There is inadequate available budget to implement the Astro2010 Decadal Survey recommendations as written; there is also changed external context.
  - Due to budget constraints, no new missions other than Explorers can enter formulation before FY17 (when JWST approaches launch).
  - ESA has ended the joint LISA and IXO studies.
- Currently there are no new starts for large missions.
  - NASA must earn back the privilege of starting large missions.
- Large strategic missions in the future are possible only if the Astrophysics budget recovers a large portion of the funds freed up as the JWST budget begins to decrease in FY18 and out.

The goal is to start a new strategic astrophysics mission as soon as funding becomes available while continuing to advance the science during the interim.



# Astrophysics Budget Strategy

- Use the scientific priorities of the Astro2010 Decadal Survey to guide strategy and inform choices.
- In the absence of new missions, progress against decadal priorities is maintained through the core research program, through continued operation of existing missions and their GO programs, through the suborbital programs, and through frequent Explorer opportunities.
  - Support for all of these is maintained in the President's FY13 budget request.
- In order to prepare for a new mission starting in FY17, a near term program of mission concept studies and technology development will be undertaken, with the goal of informing a mid-decade decision on which mission(s) will begin formulation starting in FY17
  - Currently there are no new starts for large missions. Moderate missions ("probes") must be considered for start in FY17, in addition to a large mission (e.g., WFIRST), to be prepared for a mid-decade decision.
  - Mission concepts studied must derive from the science of the missions and recommendations prioritized in the Decadal Survey.



# Astrophysics Budget Strategy

2012

- Study WFIRST options.
- Solicit ideas from the community for studies of moderate missions that address DS priorities.
- Establish community study teams for mission concepts.
- Initiate mission concept studies within the programs.
- Use community analysis groups to inform process.

2013

- Use competed and directed technology programs to develop enabling technology and mission concepts.

2014

- Continue from 2013.

2015

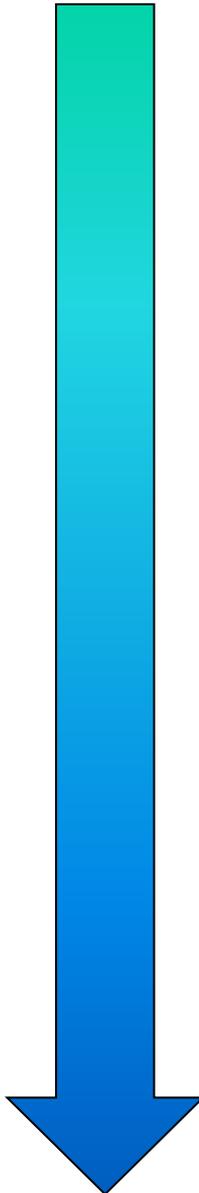
- Using community input, conduct prioritization and decision process for identifying FY17 new start.
- Start pre-formulation for new FY17 strategic mission.
- Start NRC mid-decade review.

2016

- Complete mid-decade review. Revise plans as necessary in response to report.

2017

- New start for strategic mission.





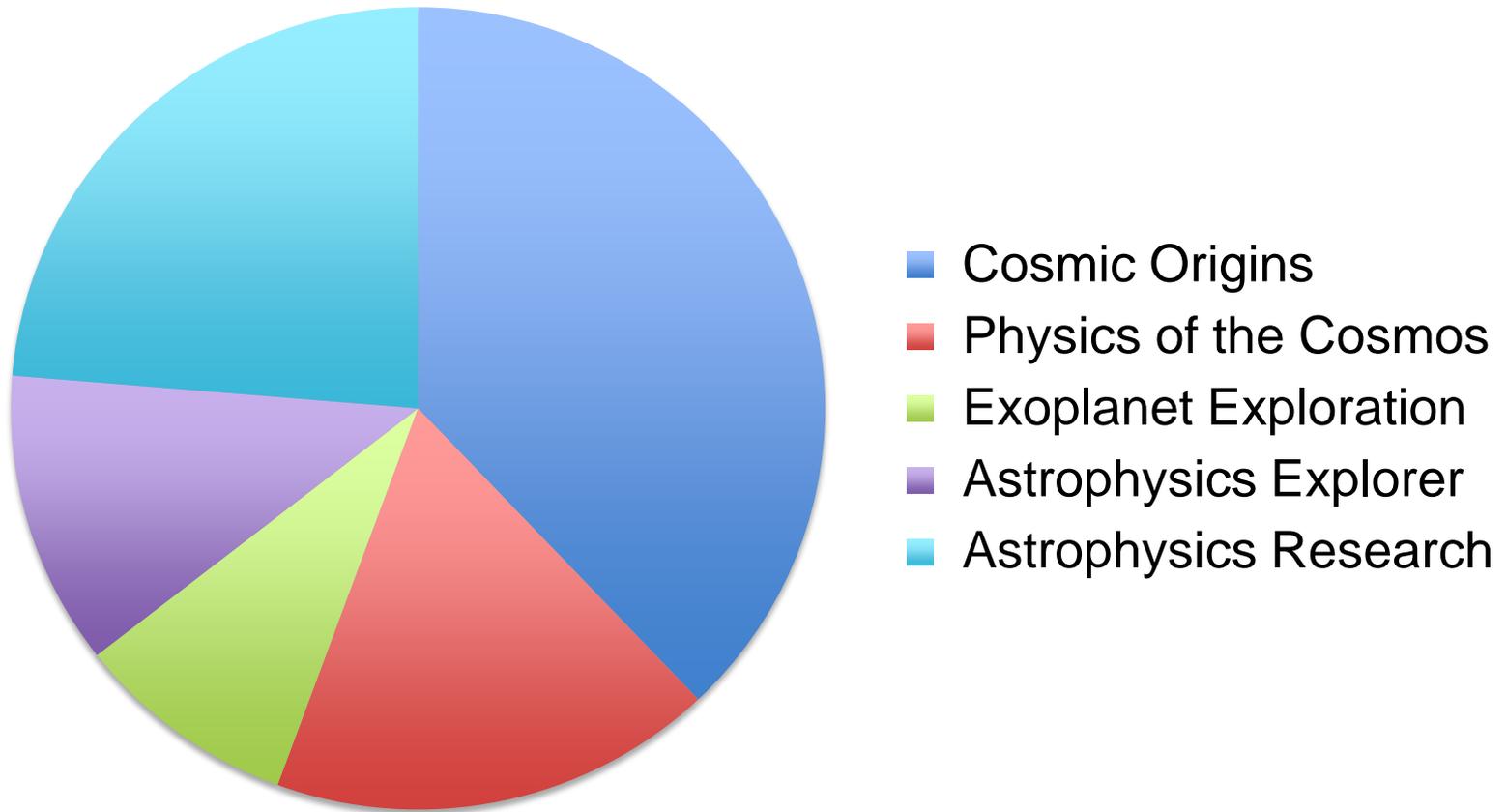
# Astrophysics Budget Strategy

- Mission concept studies generate candidates for future strategic missions
  - An FY17 new start and an efficient development requires mature technology
  - Mission concept studies identify technology requirements, and this guides technology investment
- Mission concepts studied must derive from the science of the missions and recommendations prioritized in the Decadal Survey.
  - WFIRST DRM1 and DRM2 (done)
  - Gravity wave concepts to advance the LISA science (done)
  - X-ray concept studies to advance the IXO science (done)
  - UV/Vis science objectives to drive concept studies (probes?) and technology that advances the science of a future UV telescope (underway)
  - Use of NRO telescopes to advance WFIRST science (planned)
  - Exoplanet probe concept studies to advance science of a planet imaging mission (planned)
  - Additional concept studies will be undertaken



# FY2013 President's Request for NASA Astrophysics

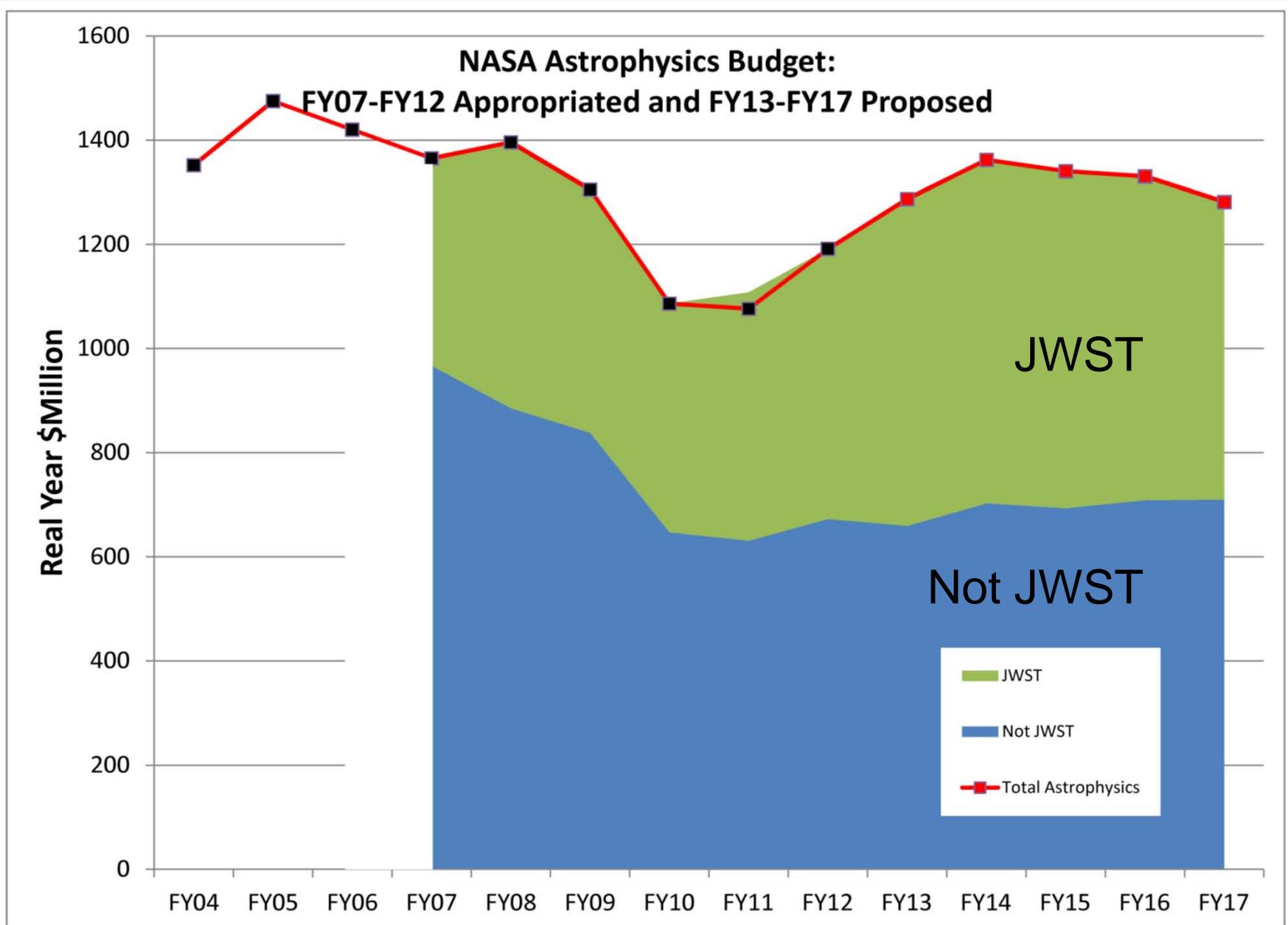
~\$633M Total \*

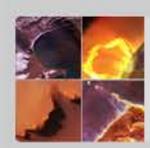


\* Does not include SMD budgets that are bookkept in the Astrophysics budget line



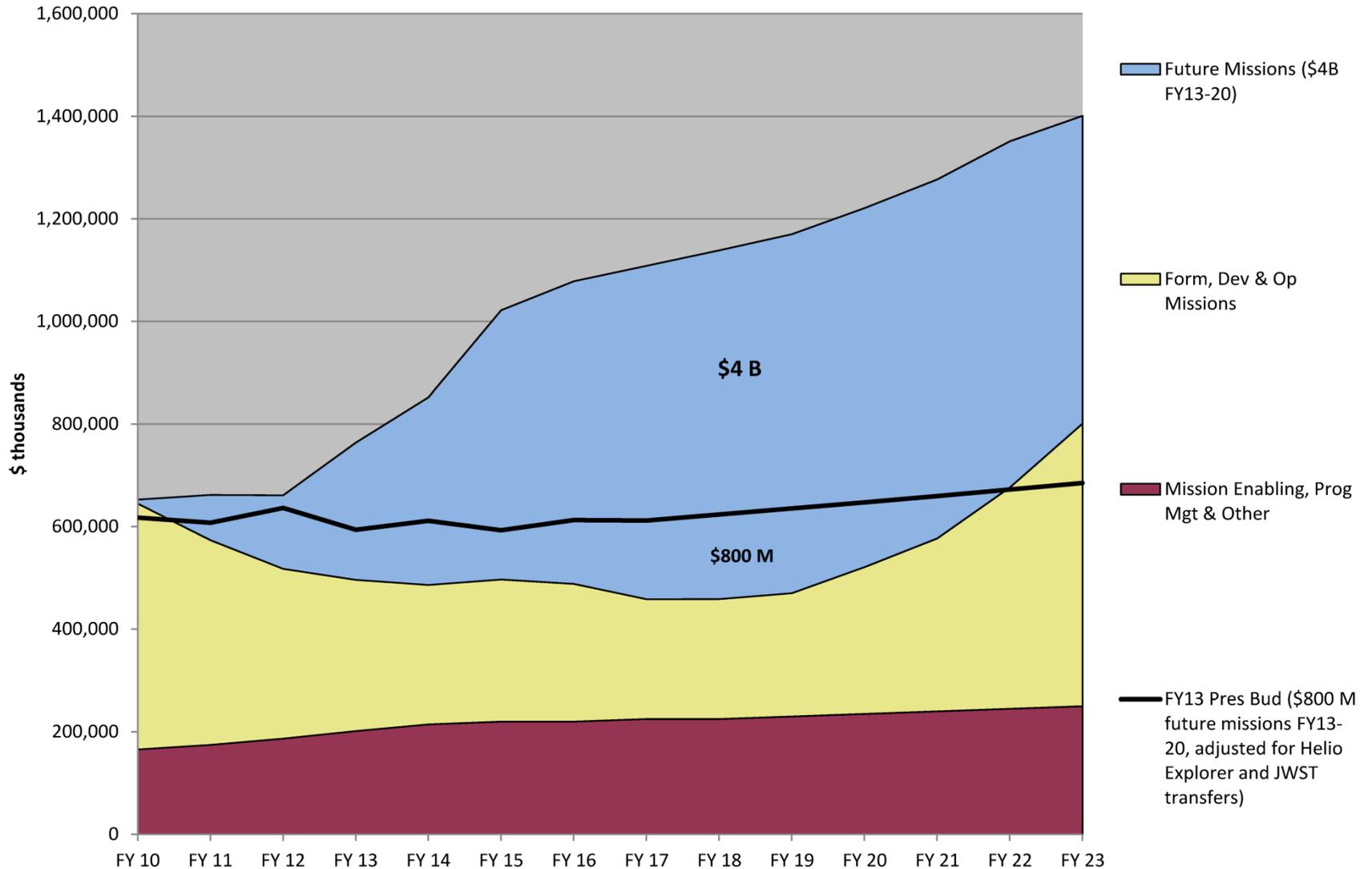
# President's FY13 Budget Request for Astrophysics

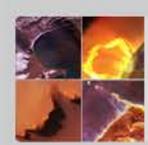




# Changes since the Astro2010 Decadal Survey

## Astrophysics FY10 President's Budget (less JWST) and Estimates 2011-2023 as Presented to Decadal Survey



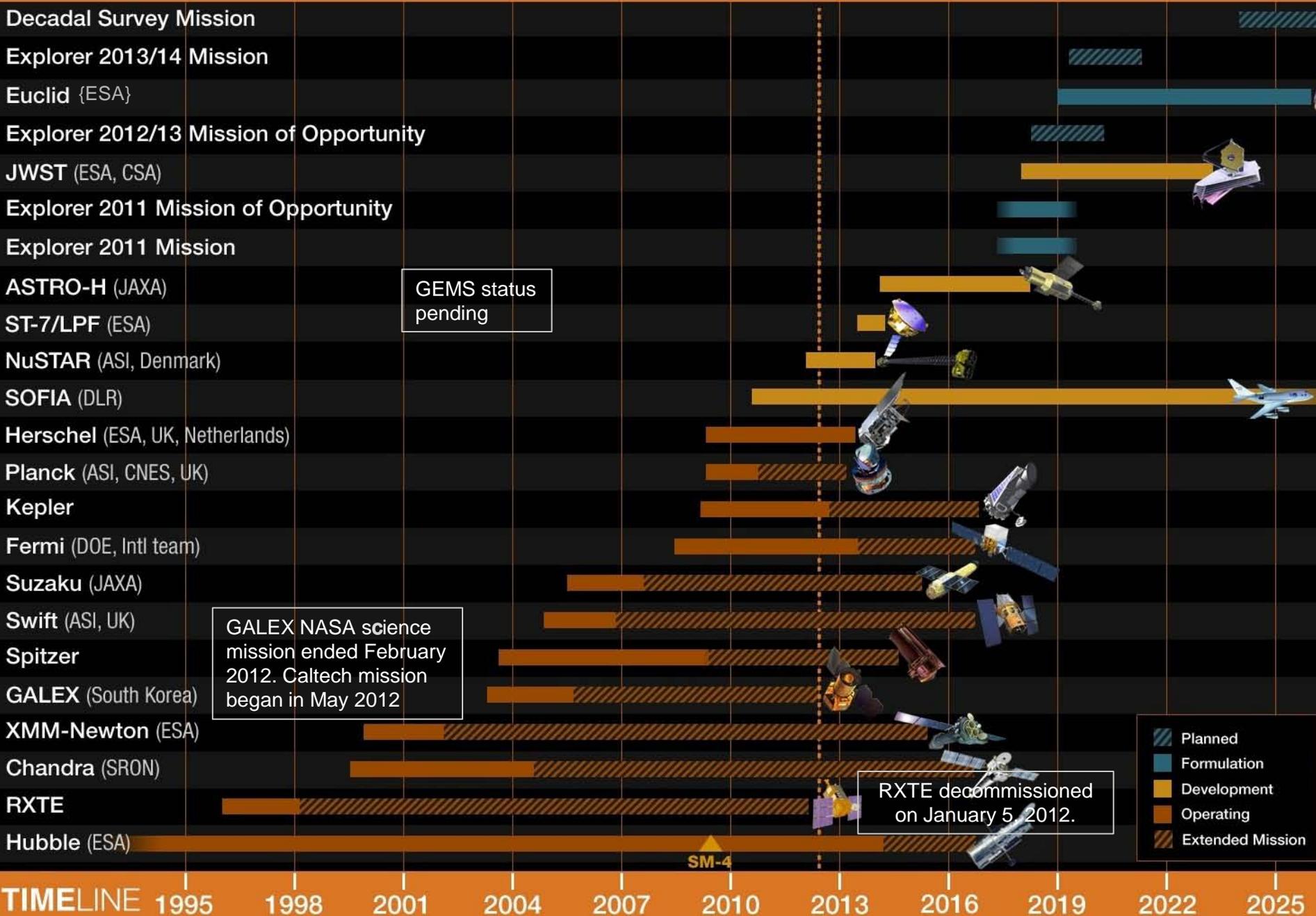


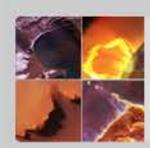
# Astrophysics Budget Strategy

- A white paper describing the response to the Decadal Survey recommendations, consistent with current budget guidance, is under development.
  - Will review with Committee on Astronomy and Astrophysics and Astrophysics Subcommittee in the Fall.
  - Will release to the community before Long Beach AAS meeting.
- Will outline calls and studies planned to prepare for:
  - Mid-decade decision to start a new strategic mission after JWST (and possibly a second mission, depending on out-year budget guidance).
  - Mid-decade review.
  - Next decadal survey.
- Basic content is already known.
  - Competed and directed technology development in response to technology prioritizations.
  - RFIs and study teams for missions and probes (e.g., X-ray, Gravitational wave, UV/Visible, ...)
  - Studies of potential missions leading to concept studies, e.g., WFIRST (DRM1), WFIRST probe (DRM2), Use of NRO telescopes, Exoplanet probes, X-ray mission concepts, GW mission concepts, other probes, etc.

# Astrophysics Missions timeline

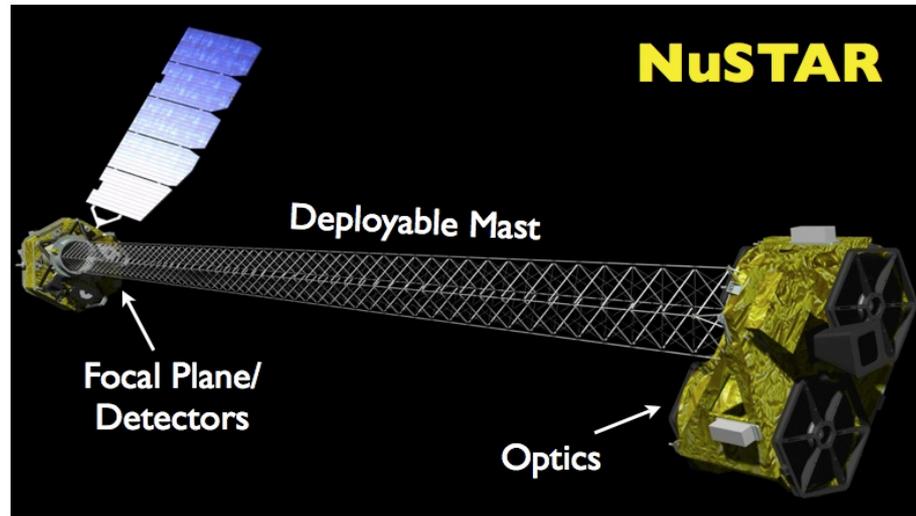
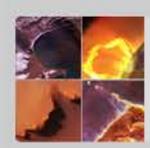
Last updated: May 30, 2012





# Backup Slides

# NuSTAR Launched June 13, 2012



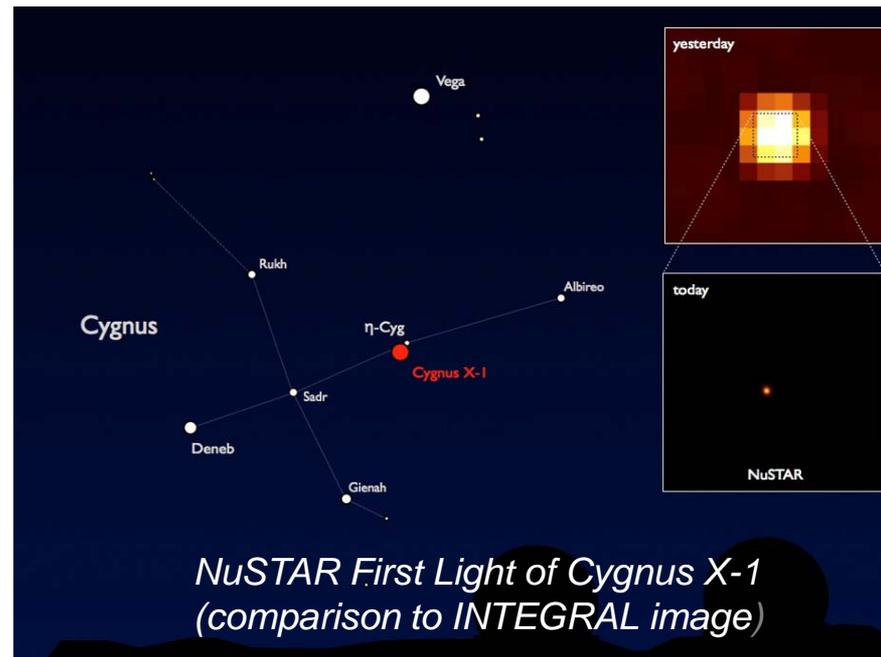
Arriving at Kwajalein Atoll



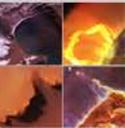
NuSTAR dropped from Stargazer

# NuSTAR Launched June 13, 2012

- NuSTAR uses the first focusing telescopes to image the sky hard X-rays (6 - 79 keV) (previous missions used coded apertures).
- During a two-year primary mission phase, NuSTAR will:
  - Take a census of collapsed stars and black holes of different sizes by surveying regions surrounding the center of the Milky Way Galaxy and performing deep observations of the extragalactic sky;
  - Map recently-synthesized material in young supernova remnants to understand how stars explode and how elements are created; and
  - Understand what powers relativistic jets of particles from the most extreme active galaxies hosting supermassive black holes.
- NuSTAR has two co-aligned grazing incidence telescopes with multi-coated optics and innovative hard X-ray detectors.
- NuSTAR deploys an extendable mast to achieve a 10-meter focal length.
- NuSTAR improves sensitivity, spatial, and spectral resolution by factors of 10 to previous hard X-ray missions.



# Astrophysics - Missions in Formulation & Implementation



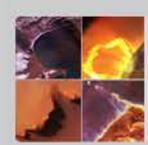
Project	Overall previous months				This Month					Comments
	-4	-3	-2	-1	O	T	C	S	P	
<b>Physics of the Cosmos</b>	G	G	G	G	G	G	G	G	G	
ST-7 (NET Apr 2014)	G	G	G	G	G	G	G	G	G	
<b>Explorer Program</b>										
NuSTAR (Jun 13, 2012)	Y	Y	G	G	G	G	Y	G	G	Successful launched June 13, 2012. On-orbit science calibration ongoing.
Astro-H (Aug 2014)	Y	Y	Y	G	G	G	G	Y	G	No update on JAXA LRD. Heat switch failure in EM instrument.
GEMS (Nov 2014)	G/Y	Y								Project non-confirmed.
FINESSE, TESS, NICER, GUSSTO	G	G	G	G	G	G	G	G	G	Phase A reports due Sept 21, 2012.
<b>Cosmic Origins</b>	G	G	G	G	G	G	G	G	G	
SOFIA (ongoing)	G/Y	Y	Y	Y	Y	G/Y	G	Y	G/Y	Conducting system-level line operations tests.
<b>Exoplanet Exploration</b>	G	G	G	G	G	G	G	G	G	
<b>Balloon Prog</b> (ongoing)	G	G	G	G	G	G	G	G	G	Superpressure balloon test flight in Sweden waiting for suitable weather.

O: Overall, C: Cost, S: Schedule, T: Technical, P: Programmatic

**G** On plan, adequate margin

**Y** Problems, working to resolve within planned margin

**R** Problems, not enough margin to recover



# Astrophysics – Operating Missions

Mission	Launch	End Date	Phase	-4	-3	-2	-1	June	Comments
<b>Hubble</b>	1990-04-24	2016-09-30	Prime	G	G	G	G	G	COS back in nominal operation at new lifetime position of detector. 20% of planned Venus Transit data acquired.
<b>Chandra</b>	1999-07-23	2016-09-30	Ext	G	G	G	G	G	
<b>XMM-Newton</b>	1999-12-10	2015-03-31	Ext	G	G	G	G	G	
<b>GALEX</b>	2003-04-28	2012-02-07	Ext			S	S	S	Space Act Agreement signed on May 14, 2012. GALEX on loan to Caltech for 3 years.
<b>Spitzer</b>	2003-08-25	2014-09-30	Ext	G	G	G	G	G	
<b>Swift</b>	2004-11-20	2016-09-30	Ext	G	G	G	G	G	
<b>Suzaku</b>	2005-07-10	2015-03-31	Ext	G	G	G	G	G	
<b>Fermi</b>	2008-06-11	2016-09-30	Prime	G	G	G	G	G	
<b>Kepler</b>	2009-03-07	2016-09-30	Prime	G	G	G	G	G	Failure of reaction wheel #2. Spacecraft back in operational mode with 3 reaction wheels.
<b>Herschel</b>	2009-05-14	2013-05-14	Prime	G	G	G	G	G	
<b>Planck</b>	2009-05-14	2013-01-31	Ext	G	G	G	G	G	SPC approved another 6 month extension to warm LFI operations.

**G** On plan, adequate margin

**Y** Problems, working to resolve within planned margin

**R** Problems, not enough margin to recover

Space Act Agreement. GALEX on loan to Caltech.

# Astrophysics Mission Events

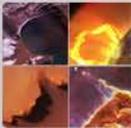
CY2012

2013

2014

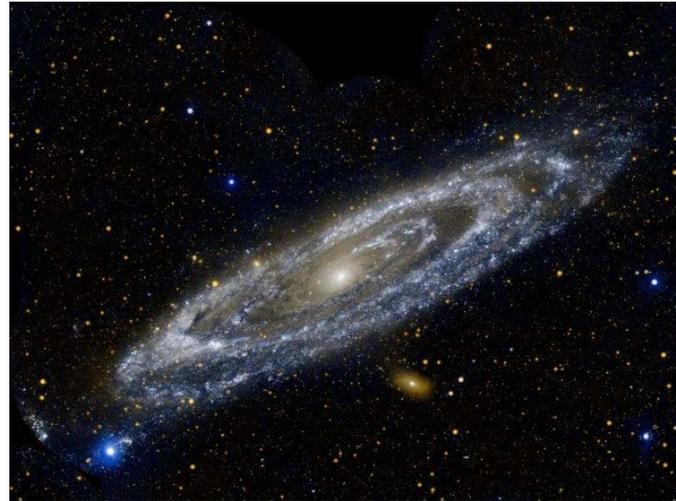
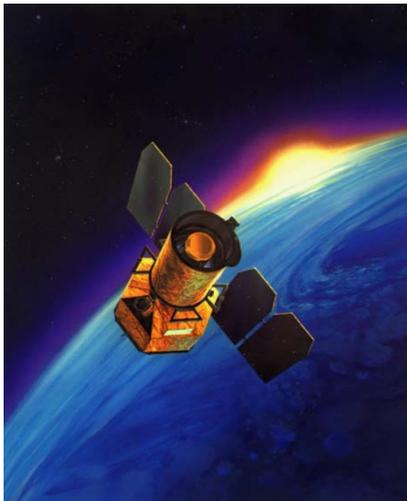
Last Updated: July 20, 2012

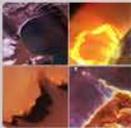
Mission Launches etc.	▼ Jun 13 <b>NuSTAR</b>	▼ Spring <b>Explorer</b> Downselect	▼ Ship Flt to JAXA <b>Astro-H</b> ▼ CSI NET April <b>LPF/ST-7</b> ▼ TBD 2014 <b>Astro-H</b>
<b>Suborbital</b> <u>Rocket Program.</u>	▼ Mar C I B E R 1-3	▼ Jan X A C T 1	▼ Jun X A C T 2
<u>Balloon Campaigns</u> Antarctica Sweden Ft. Sumner (spr) Palestine Ft. Sumner (fall) Australia New Zealand	▼ Oct F O R T I S 1	▼ Oct S L I C E 1	▼ Nov I M A G E R X 1
<b>Opportunities</b>	▼ Dec A C C E S S 1	▼ Dec D X L 1	▼ Jan X A C T 1
	▼ Jun X A C T 2	▼ Sep A C C E S S 2	▼ Oct X Q C 5
	▼ Oct T B D 3	▼ Oct T B D 2	▼ Feb A C C E S S 3
	▼ Feb A C C E S S 4	▼ TBD E X O S 3	▼ TBD F O R T I S 2
	▼ Aug A C C E S S 4		



# GALEX - A New Paradigm

- Caltech is operating GALEX with private funds and may continue the science mission for as long as three years (extendable).
  - Caltech currently has funds for 5 months of operations from Keck Institute, Weizmann Institute, Cornell University, International consortium (GAMA/Herschel-Atlas/DINGO).
  - No change in data access for the community collected during the Caltech mission: all data will continue to be made publicly available after a 12 month period of exclusivity.
- A Space Act Agreement was signed on May 15, 2012 between NASA and Caltech which loans the spacecraft to Caltech.
- NASA holds long term liability and is responsible for decommissioning and re-entry.





# GEMS

- The NASA Science Mission Directorate Program Management Council met on May 10, 2012 and evaluated the GEMS Key Decision Point C (Confirmation Review).
- Based on this review and the project's readiness documents, the Decision Authority for the GEMS project has non-confirmed the GEMS project to enter implementation, thereby terminating the mission.
- The primary rationale for non-confirmation is as follows:
  - Unacceptable cost, schedule, and technical risk of an AO-selected, cost capped mission.
    - After evaluating available cost models and the Standing Review Board (SRB) cost and technical risk assessment, the Science Mission Directorate (SMD) Program Management Council (DPMC) concluded that the GEMS Project was not executable at the Project's requested funding level.
    - SRB assessment was that the most significant cost risks are: the XPI instrument, Optical Boom integration complexity, and mission avionics unit lack of maturity.
    - Independent (SRB and Aerospace) 50% confidence cost estimates driven by these risks are more than 25% over the AO-set PI cost cap at which the Project was proposed and selected. (AO-set cost cap was \$119M and later adjusted to \$121M) GSFC Management-proposed cost commitment is more than 20% over the AO-set cost cap. NOTE: AO-set PI cost cap does not include the Launch vehicle.
    - GEMS turned out to be a greater technical challenge than originally anticipated.
  - Significant descopes were taken during formulation to improve mass, power, cost, and schedule margins.
    - Remaining descopes yield relatively small savings and/or have risk impact.



# GEMS

- NASA is conducting an independent review of SMD's decision process to non-confirm GEMS. Report will be provided to Congress.
- Under Public Law 112-55, NASA is required to provide Congress with 15 days notification before a project is terminated and the funds are reallocated.
- Until the report is provided to Congress and the notification process is completed, the GEMS project continues.
- Funding planned for GEMS will go back to the Future Explorer budget to enable robust selections from the Explorer 2011 AO and to enable acceleration of future Explorer AOs.

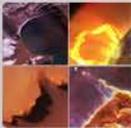


# SOFIA Instrument Selection



*First generation HAWC instrument.*

- The SOFIA Second Generation Instrument selection was announced on April 17, 2012. The selected proposals were judged to have the best science value and feasible development plans.
  - **The High-resolution Airborne Wideband Camera Polarization (HAWC-Pol)**, Charles Dowell, JPL. Upgrades the HAWC instrument to include the capability to make polarimetric observations at far-infrared wavelengths.
  - **HAWC++**, Johannes Staguhn, Johns Hopkins University. Provides a sensitive, large-format detector array to the HAWC-Pol investigation, increasing its observing efficiency.
- Upgraded HAWC will deliver second generation capabilities on a first generation schedule – no delay in HAWC commissioning.
- Next SOFIA instrument AO in 2014.



# Euclid – NASA Contribution

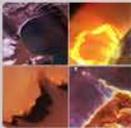
- NASA's contribution to ESA's Euclid mission will be the Near Infrared Spectrograph and Photometer (NISP) flight subassemblies (detector + ASIC+ cryo-cable = 'triplet') that meet ESA's requirements for testing and characterization.
  - This contribution will include manufacture of the flight subassemblies by Teledyne followed by characterization and testing of the flight subassemblies by NASA.
  - After delivery, ESA will be responsible for integrating the subassemblies into the NISP focal plane. ESA will be responsible for solving any problems that arise.
- NASA risk for cost overrun is low.
  - ESA has agreed to not have any flight requirements for the triplets that are not already demonstrated by the prototype triplets developed by ESA. This lowers cost risk for the flight triplets.
  - The cost of characterization and testing is reduced through bringing that work in-house at NASA.
  - The cost risk of problems during I&T is minimized by ending NASA's obligations at delivery of the characterized and tested subassemblies.
- This division of responsibilities is the same as NASA and ESA agreed for Planck.



# Euclid – NASA Science Return

- ESA will appoint a NASA-selected member to the Euclid Science Team.
- The Euclid Consortium (EC) will appoint a NASA-selected member to the Euclid Consortium Board and up to 40 NASA-selected members to the Euclid Consortium, commensurate with NASA's hardware contribution to the mission.
- NASA-appointed EC members will have the same data rights as European EC members and will be fully integrated into the Science Working Groups of the EC. The roles and responsibilities of the NASA-appointed EC members will be consistent with ESA's Euclid Science Management Plan and with the Euclid Consortium Science Policies.
- Solicitation for NASA-selected members issued May 23, 2012 as a ROSES-12 amendment; proposals due August 15, 2012.
- MOU agreed to by NASA and ESA, in approval process on both sides, will be signed after after the full ESA Council meeting scheduled in December 2012.





# WFIRST

- Astro2010 recommended WFIRST as the highest priority large mission.
  - The President's FY13 NASA budget request includes no new large missions; Astrophysics expects none before JWST is successfully completed.
  - FY13 budget request does not support originally planned WFIRST technology development and includes no funding identified for WFIRST.
  - WFIRST will not launch in this decade (2018 + 7 yrs = 2025).
  - Astrophysics does not anticipate budget growth in the foreseeable future.
- Science Definition Team (SDT) will deliver its final report in August 2012.
  - The first Design Reference Mission (DRM1) is a proof of concept that a mission can be constructed that is compliant with the Astro2010 recommendation. Second Design Reference Mission (DRM2) will not duplicate capabilities of Euclid, LSST, and JWST in advancing science objectives of WFIRST. Look for cost savings.
  - SDT report shows that (a) DRM1 is fully responsive to the objectives of Astro2010 and (b) DRM2 offers a low-cost near-IR survey opportunity, but the limited 3-year life precludes full compliance with Astro2010 goals.
  - An independent cost and technical assessment of DRM2 is underway.
- NASA is proceeding as follows:
  - Through the SDT's DRMs, established a basis for WFIRST planning.
  - Partner on ESA's Euclid to advance some of the science of Astro2010 and WFIRST.
  - Advance the technology and planning required for WFIRST as the budget allows.
  - Contemplate follow-on trade studies to the SDT's Design Reference Missions.



# Explorer Program

- FY13 budget request does not support an AO for both missions and missions of opportunity (MOs) in late CY12.
  - First priority in the Explorer program is to complete Explorers in development: NuSTAR, SXS/Astro-H.
  - Second priority is to downselect and fund the development of one mission and one MO from the projects currently conducting Phase A studies (FINESSE/TESS, GUSSTO/NICER).
  - Third priority is to issue new AOs leading to the development of new missions.
- Funding planned for GEMS will remain in the Explorer Program.
  - Immediately begin the new projects when they are downselected in Spring 2013.
  - Advance the next mission AO.
- The Astro2010 Decadal Survey said to “Enable rapid response to science opportunities; augments current plan by 2 MIDEXs, 2 SMEXs, and 4 MoOs.” Astrophysics Division is planning a series of AOs (subject to budget approval):
  - An AO for an MO with a \$50-60M cost cap in Sept/Oct 2012.
  - An AO for a SMEX in late-2013 with the cost caps and dates TBD by fall 2012.
  - An AO for an EX and MO in 2015.



# 2012 Senior Review Results

Mission	Result
<b>Chandra</b>	<ul style="list-style-type: none"><li>- Fully fund as budgeted thru FY16</li><li>- Augment Guest Observer Program at ½ Project request</li></ul>
<b>Fermi</b>	<ul style="list-style-type: none"><li>- Mission extension thru FY16</li><li>- Reduced budget starting in FY14</li></ul>
<b>Hubble</b>	<ul style="list-style-type: none"><li>- Fully fund as budgeted</li></ul>
<b>Kepler</b>	<ul style="list-style-type: none"><li>- Extend mission operations thru FY16</li><li>- Augment Guest Observer and Participating Science Program at 1/2 Project request</li></ul>
<b>Planck</b>	<ul style="list-style-type: none"><li>- Fund US Support of 1-year extension of Low Frequency Instrument operations</li></ul>
<b>Spitzer</b>	<ul style="list-style-type: none"><li>- Extend ops thru FY14</li><li>- Closeout in FY15</li></ul>
<b>Suzaku</b>	<ul style="list-style-type: none"><li>- Extend US Science support through March 2015 (Astro-H launch +1 year)</li></ul>
<b>Swift</b>	<ul style="list-style-type: none"><li>- Extend mission operations thru FY16</li><li>- Augment Guest Observer Program per Project request</li></ul>
<b>XMM-Newton</b>	<ul style="list-style-type: none"><li>- Extend US support through March 2015</li></ul>

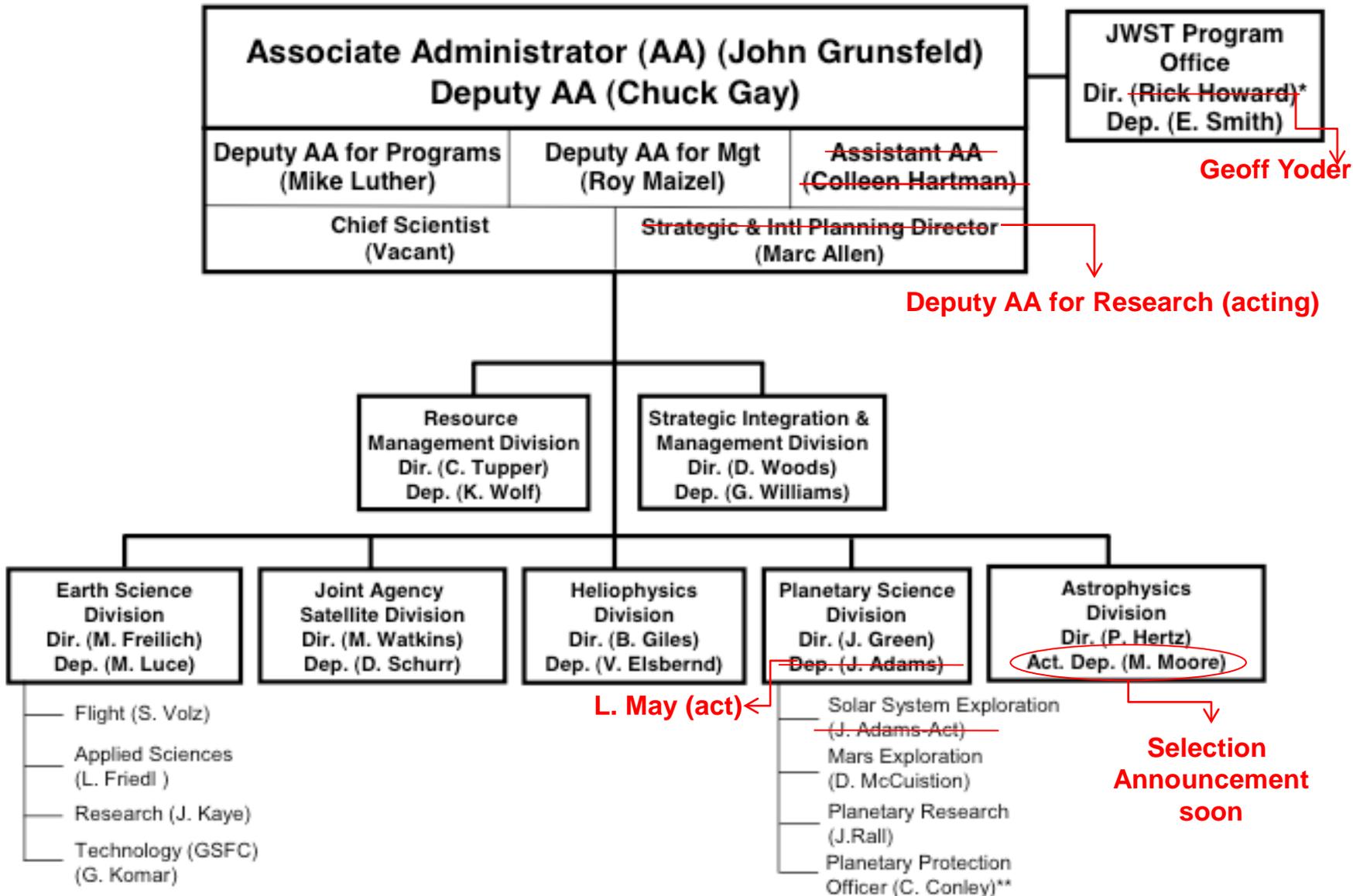
Note: All FY15 and FY16 decisions will be revisited in the 2014 Senior Review.



# Personnel Changes

- SMD
  - Colleen Hartman has moved to GSFC as Deputy Director for Science, Operations, and Program Performance
  - Marc Allen is the SMD Deputy AA for Research (Acting)
  - Planetary Science Division Deputy will be filled on an acting basis by a rotation; July's Acting DDD is Lindley Johnson
- Astrophysics Division
  - Deputy Division Director advertisement closed in April. Process is advanced toward naming new DDD within weeks.
  - Departures:
    - Kelly Johnson – start 1 year detail in Office of Chief Technologist (Jul 23)
    - Mario Perez – end of IPA (Aug 31)
    - Chris Davis – taking a new job (Sep 7)
    - Jaya Bajpayee – end of detail from GSFC (Sept 31)
    - Rita Sambruna – start 1 year detail in Office of Administrator (Oct 1)
  - Arrivals
    - Larry Petro – start IPA (Jul 1)
    - Mike Garcia – start IPA (Aug 1)
    - Keith McGregor – start IPA (mid-August)

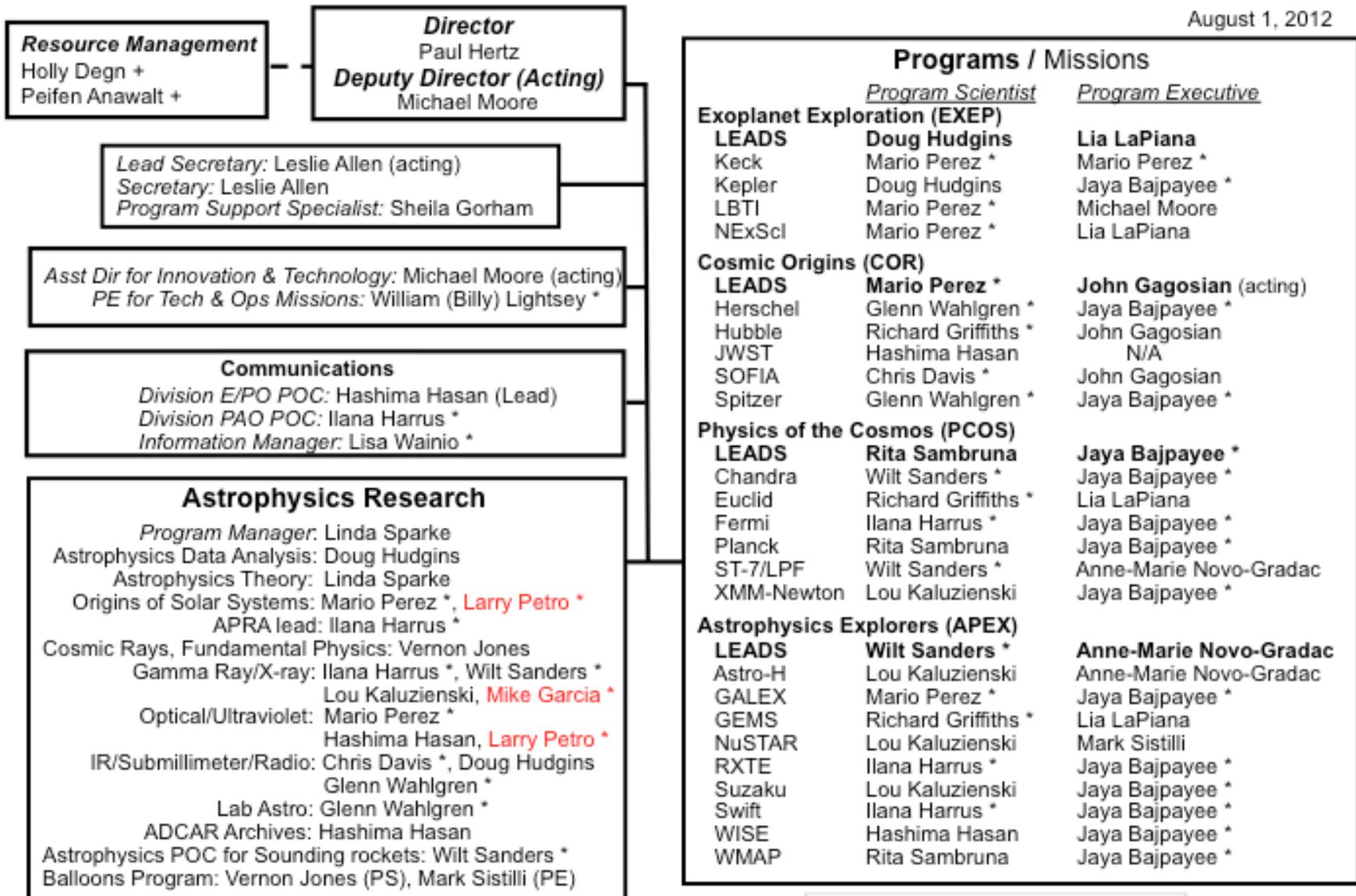
# SMD Organization Chart



\* Direct report to NASA Associate Administrator  
 \*\* Co-located from the Front Office

# Astrophysics Division Organization Chart

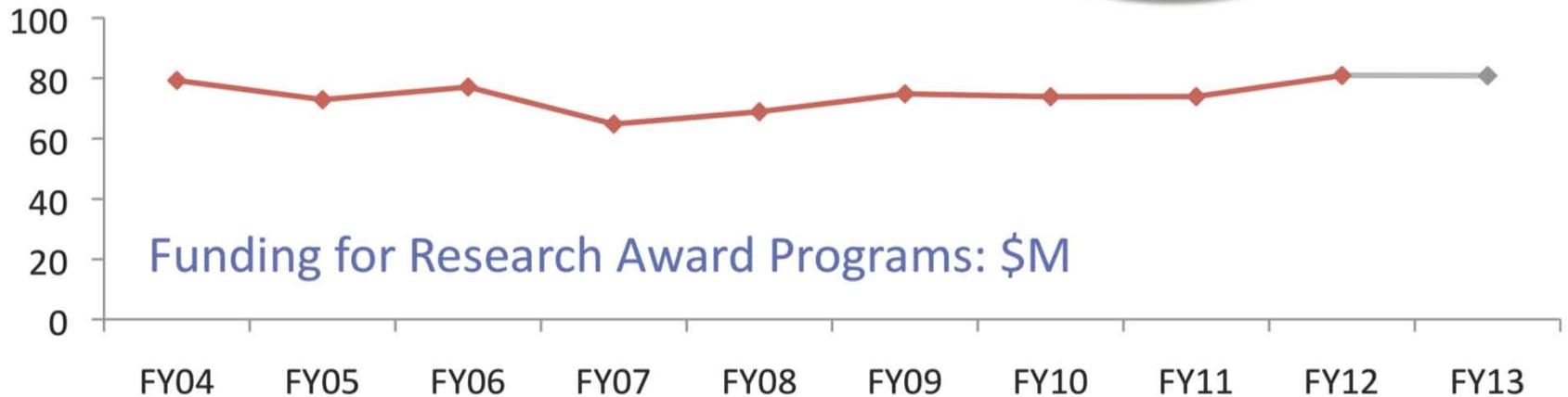
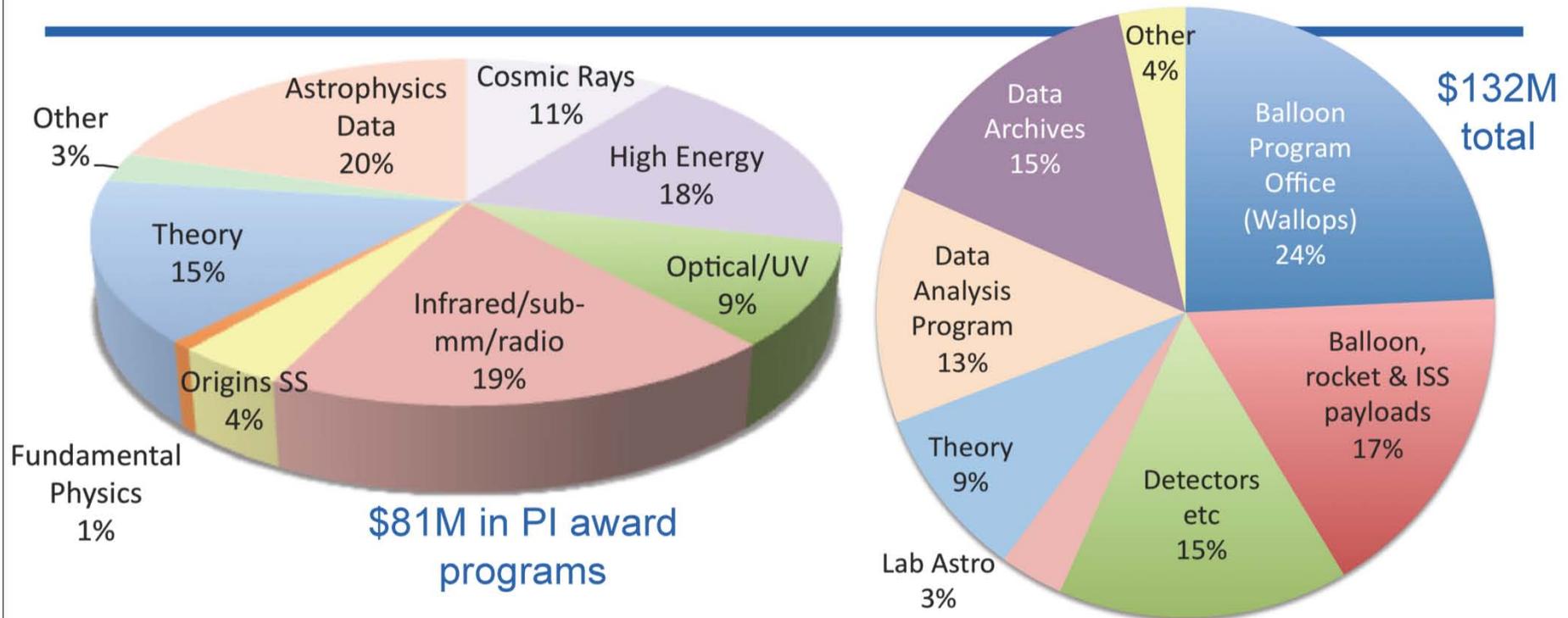
August 1, 2012



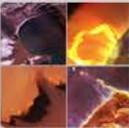
Deported: Bill Danchi, Tina Swindell, Raymond Kinzer Jr.  
Kelly Johnson on detail until August 2012.

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

# Research Program Spending in FY12



# Funding History for Research Awards



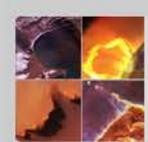
Amounts in \$k	FY04 Final	FY05 Final	FY06 Final	FY07 Final	FY08 Final	FY09 Final	FY10 Final	FY11 Final	FY12 Projected	FY13 Request
Particle Astro	\$ 8,544	\$ 7,671	\$ 8,544	\$ 7,631	\$ 6,672	\$ 8,201	\$ 8,260	\$ 8,243	\$ 8,585	
High Energy	\$ 14,779	\$ 13,693	\$ 14,779	\$ 12,782	\$ 12,406	\$ 13,886	\$ 14,110	\$ 13,911	\$ 14,909	
UV/Opt/IR/ Sub-mm	\$ 21,851	\$ 18,742	\$ 21,851	\$ 17,442	\$ 19,094	\$ 22,353	\$ 21,534	\$ 21,295	\$ 23,537	
Other	\$ 338	\$ 854	\$ 338	\$ 394	\$ 594	\$ 670	\$ 673	\$ 641	\$ 1,644	
<b>APRA Total</b>	<b>\$ 45,511</b>	<b>\$ 40,960</b>	<b>\$ 45,511</b>	<b>\$ 38,250</b>	<b>\$ 38,765</b>	<b>\$ 45,110</b>	<b>\$ 44,577</b>	<b>\$ 44,090</b>	<b>\$ 48,675</b>	
Orig Solar Systems	\$ 4,150	\$ 3,872	\$ 4,150	\$ 3,673	\$ 2,965	\$ 3,000	\$ 2,807	\$ 2,944	\$ 3,244	
Astro Theory Program	\$ 10,245	\$ 7,363	\$ 10,245	\$ 10,227	\$ 11,696	\$ 11,890	\$ 12,262	\$ 12,577	\$ 12,137	
Tech Fellows									\$ 538	
<b>R&amp;A (399131)</b>	<b>\$ 59,906</b>	<b>\$ 52,195</b>	<b>\$ 59,906</b>	<b>\$ 52,150</b>	<b>\$ 53,426</b>	<b>\$ 60,000</b>	<b>\$ 59,646</b>	<b>\$ 59,611</b>	<b>\$ 64,595</b>	<b>\$ 64,438</b>
ADAP/LTSA	\$ 15,189	\$ 15,700	\$ 15,189	\$ 12,641	\$ 12,013	\$ 14,384	\$ 13,258	\$ 14,132	\$ 16,320	\$ 16,429
<b>Core R&amp;A</b>	<b>\$ 75,095</b>	<b>\$ 67,895</b>	<b>\$ 75,095</b>	<b>\$ 64,791</b>	<b>\$ 65,439</b>	<b>\$ 74,384</b>	<b>\$ 72,904</b>	<b>\$ 73,743</b>	<b>\$ 80,915</b>	<b>\$ 80,867</b>
TPF/FS		\$ 2,000		(Foundation Science: now in ATP)						
Beyond Einstein FS	\$ 2,000	\$ 3,000	\$ 2,000							
ASMCS (399131)	Mission concept studies				\$ 3,452	\$ 442				
PCOS SR&T				(Fundamental Physics; now APRA)		\$ 968	\$ 184			
<b>TOTAL (\$M)</b>	<b>\$ 77.10</b>	<b>\$ 72.90</b>	<b>\$ 77.10</b>	<b>\$ 64.79</b>	<b>\$ 68.89</b>	<b>\$ 74.83</b>	<b>\$ 73.87</b>	<b>\$ 73.93</b>	<b>\$ 80.92</b>	<b>\$ 80.87</b>
		\$7M cut	smaller R&A cut	15% cut	partial recovery	more R&A recovery	flat	flat	growth!	growth retained

The budget for research awards increased by 9% in FY12, in response to Astro2010 Decadal Survey recommendations; this growth is retained in FY13 request



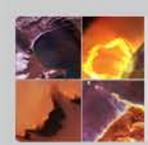
# Astrophysics ROSES Selection Statistics

	Due Date	Notification	Days	Weeks	Rec'd	Selected	Success
	from due date past review						
<b>ROSES-2012</b>							
Astrophysics Theory	13-Jul-12		3	-14.2	183	→	
Origins of Solar Systems	25-May-12		52	-5.3	46	↑	
Astrophysics Data Analysis	18-May-12		59	-4.4	294	→	
<b>ROSES-2011</b>							
Strategic Astrophysics Technology	23-Mar-12		115	5.3	49		
Astrophysics Research and Analysis	23-Mar-12		115	5.3	162	→	
Elements with NEW STARTS IN FY13					734		
Fermi Guest Investigator -- Cycle 5	20-Jan-12	1-May-12	102	4.6	224	→	67 30%
Kepler Guest Observer - Cycle 4	20-Jan-12	27-Apr-12	98	3.1	61	↑	21 34%
Roman Technology Fellowships	18-Nov-11	7-Mar-12	110	7.5	16		3 19%
Swift Guest Investigator -- Cycle 8	28-Sep-11	21-Dec-11	84	1.6	152	→	32 21%
Astrophysics Theory	3-Jun-11	28-Oct-11	147	6.2	197	→	33 17%
Origins of Solar Systems	27-May-11	7-Oct-11	133	7.1	36	→	5 14%
Astrophysics Data Analysis	20-May-11	29-Sep-11	132	6.1	278	↑↑	60 22%
<b>ROSES-2010</b>							
Strategic Astrophysics Technology	25-Mar-11	31-Aug-11	159	9.0	56	↑↑	18 32%
Astrophysics Research and Analysis	25-Mar-11	31-Aug-11	159	9.0	166	↑↑	40 24%
Elements with NEW STARTS IN FY12			weighted mean =	126	5.6	1186	279 <b>24%</b>
Core (Non-GO) solicitations				144		749	159 <b>21%</b>
Guest Observer solicitations				95		437	120 <b>27%</b>



# Astrophysics Program Content

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				<i>(FY14-17 estimates are notional)</i>			
<b>Astrophysics</b>	<b>631.1</b>	<b>672.7</b>	<b>659.4</b>	<b>703.0</b>	<b>693.7</b>	<b>708.9</b>	<b>710.2</b>
<u>Astrophysics Research</u>	<u>146.9</u>	<u>164.1</u>	<u>176.2</u>	<u>189.1</u>	<u>205.1</u>	<u>211.5</u>	<u>218.7</u>
Astrophysics Research and Analysis	59.6	64.6	64.2	65.5	66.8	68.2	69.5
Balloon Project	26.8	31.6	31.3	31.2	32.8	34.2	34.3
<u>Other Missions and Data Analysis</u>	<u>60.5</u>	<u>67.9</u>	<u>80.6</u>	<u>92.3</u>	<u>105.4</u>	<u>109.2</u>	<u>114.8</u>
Keck Single Aperture	2.2	2.3	2.4	2.4	2.5	2.5	2.5
Astrophysics Data Analysis Program	14.1	16.3	18.3	18.5	18.5	19.1	19.1
Astrophysics Data Curation and Archival	20.8	20.1	20.0	19.6	21.7	22.1	22.2
Astrophysics Senior Review			16.3	24.5	33.5	35.2	40.0
Education and Public Outreach	13.2	15.4	10.1	10.1	10.1	10.1	10.1
Directorate Support - Space Science	10.1	13.7	13.5	13.9	14.0	14.5	14.5
Directed Research and Technology				3.3	5.2	5.6	6.4
<u>Cosmic Origins</u>	<u>229.1</u>	<u>237.3</u>	<u>240.4</u>	<u>228.5</u>	<u>215.1</u>	<u>205.3</u>	<u>205.7</u>
Hubble Space Telescope (HST)	91.7	95.7	98.3	98.3	94.3	90.2	90.5
SOFIA	79.9	84.2	85.5	88.0	88.0	86.0	85.9
<u>Other Missions And Data Analysis</u>	<u>57.6</u>	<u>57.4</u>	<u>56.6</u>	<u>42.2</u>	<u>32.8</u>	<u>29.1</u>	<u>29.3</u>
Spitzer Space Telescope	22.7	17.8	9.8				
Herschel	24.6	24.0	20.8	15.8	5.8		
Cosmic Origins SR&T	7.9	10.6	19.4	19.5	20.7	21.7	21.8
Cosmic Origins Future Missions	0.7	1.0	1.7	1.7	1.0	2.0	2.0
Cosmic Origins Program Management	1.7	4.0	4.9	5.2	5.3	5.4	5.5



# Astrophysics Program Content (cont'd)

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				<i>(FY14-17 estimates are notional)</i>			
<u>Physics of the Cosmos</u>	<u>108.7</u>	<u>108.3</u>	<u>111.8</u>	<u>109.6</u>	<u>96.3</u>	<u>92.7</u>	<u>74.6</u>
Chandra X-Ray Observatory	60.6	54.7	56.6	56.6	56.6	56.7	51.2
Fermi Gamma-ray Space Telescope	22.3	25.3	25.0	24.5	17.5	12.9	
Planck	8.1	7.2	6.8	4.6	0.8		
XMM-Newton	1.2	2.1	1.9	1.9			
Physics of the Cosmos SR&T	13.9	15.0	14.9	15.3	15.3	16.0	16.2
Physics of the Cosmos Program Management	2.3	3.1	4.7	5.0	5.1	5.2	5.3
Physics of the Cosmos Future Missions	0.3	1.0	1.8	1.7	1.0	2.0	2.0
<u>Exoplanet Exploration</u>	<u>46.4</u>	<u>50.8</u>	<u>56.0</u>	<u>41.6</u>	<u>43.3</u>	<u>42.4</u>	<u>45.6</u>
Kepler	16.8	19.6	13.6	0.2			
Large Binocular Telescope Interferometer	1.5	2.0	3.8	2.9	2.0	0.5	0.5
Keck Operations	3.6	3.2	3.3	3.4	3.5	3.5	3.5
Keck Interferometer	0.1	0.4					
Wide Field Infrared Space Telescope	3.6						
Exoplanet Exploration SR&T	14.9	18.1	28.0	28.2	30.8	31.1	34.3
Exoplanet Exploration Program Management	4.8	6.0	6.1	5.7	5.9	6.0	6.0
Exoplanet Exploration Future Missions	1.2	1.5	1.2	1.2	1.2	1.2	1.2



# Astrophysics Program Content (cont'd)

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				<i>(FY14-17 estimates are notional)</i>			
<u>Astrophysics Explorer</u>	<u>100.0</u>	<u>112.2</u>	<u>75.1</u>	<u>134.3</u>	<u>133.9</u>	<u>157.0</u>	<u>165.6</u>
Nuclear Spectroscopic Telescope Array (NuSTAR)	36.1	11.8	4.7	4.4			
Gravity and Extreme Magnetism	23.0	63.2	46.4	32.9	2.7	0.2	
<u>Other Missions and Data Analysis</u>	<u>41.0</u>	<u>37.2</u>	<u>24.1</u>	<u>97.1</u>	<u>131.2</u>	<u>156.8</u>	<u>165.6</u>
Astro-H (SXS)	16.9	16.2	4.4	1.8	1.0	0.9	
SWIFT	6.3	4.3	4.4	4.4			
Wide-Field Infrared Survey Explorer	7.3	4.5	0.2				
Suzaku (ASTRO-E II)	1.8	0.3	0.3				
GALEX	6.2	0.6					
Wilkinson Microwave Anisotropy Probe (WMAP)	1.6	1.0					
Rossi X-Ray Timing Explorer (RXTE)	0.9						
Astrophysics Explorer Future Missions		3.1	10.6	85.6	124.0	149.6	159.3
Astrophysics Explorer Program Management		7.3	4.1	5.3	6.2	6.3	6.4