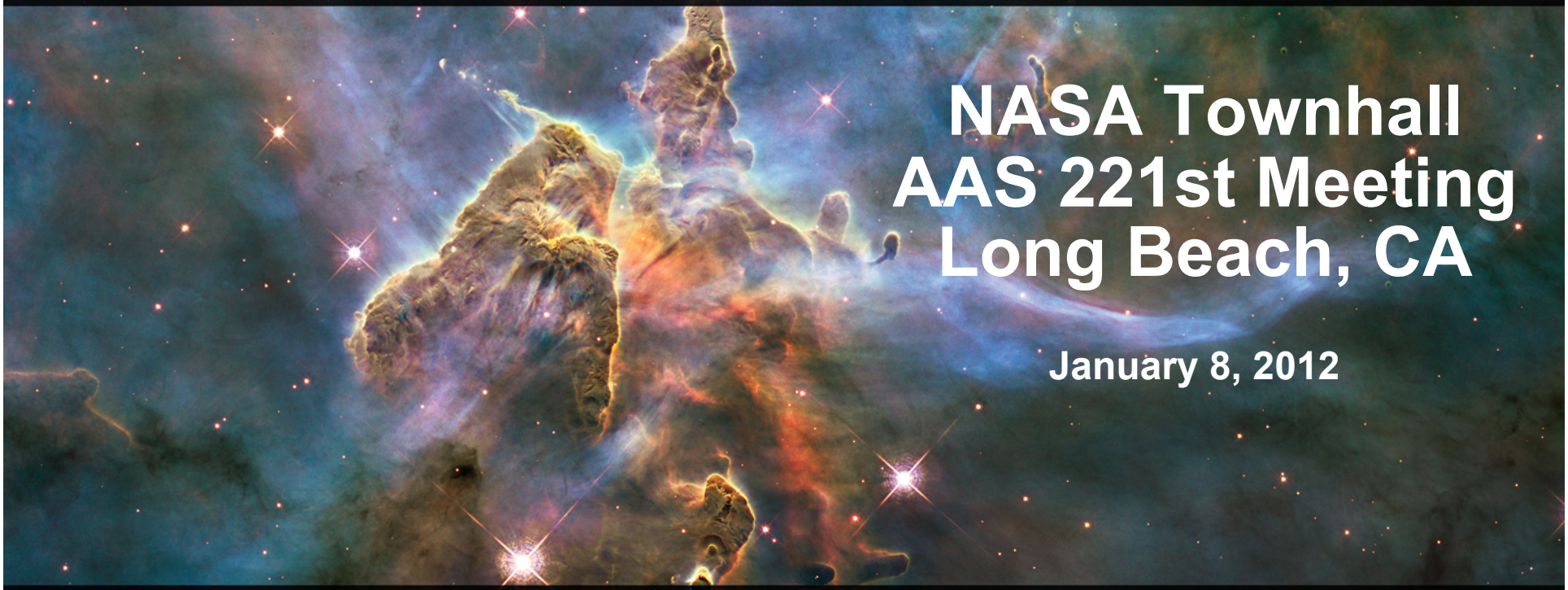
National Aeronautics and Space Administration



NASA Townhall
AAS 221st Meeting
Long Beach, CA

January 8, 2012

John Grunsfeld

Associate Administrator
Science Mission Directorate

Paul Hertz

Director
Astrophysics Division
Science Mission Directorate

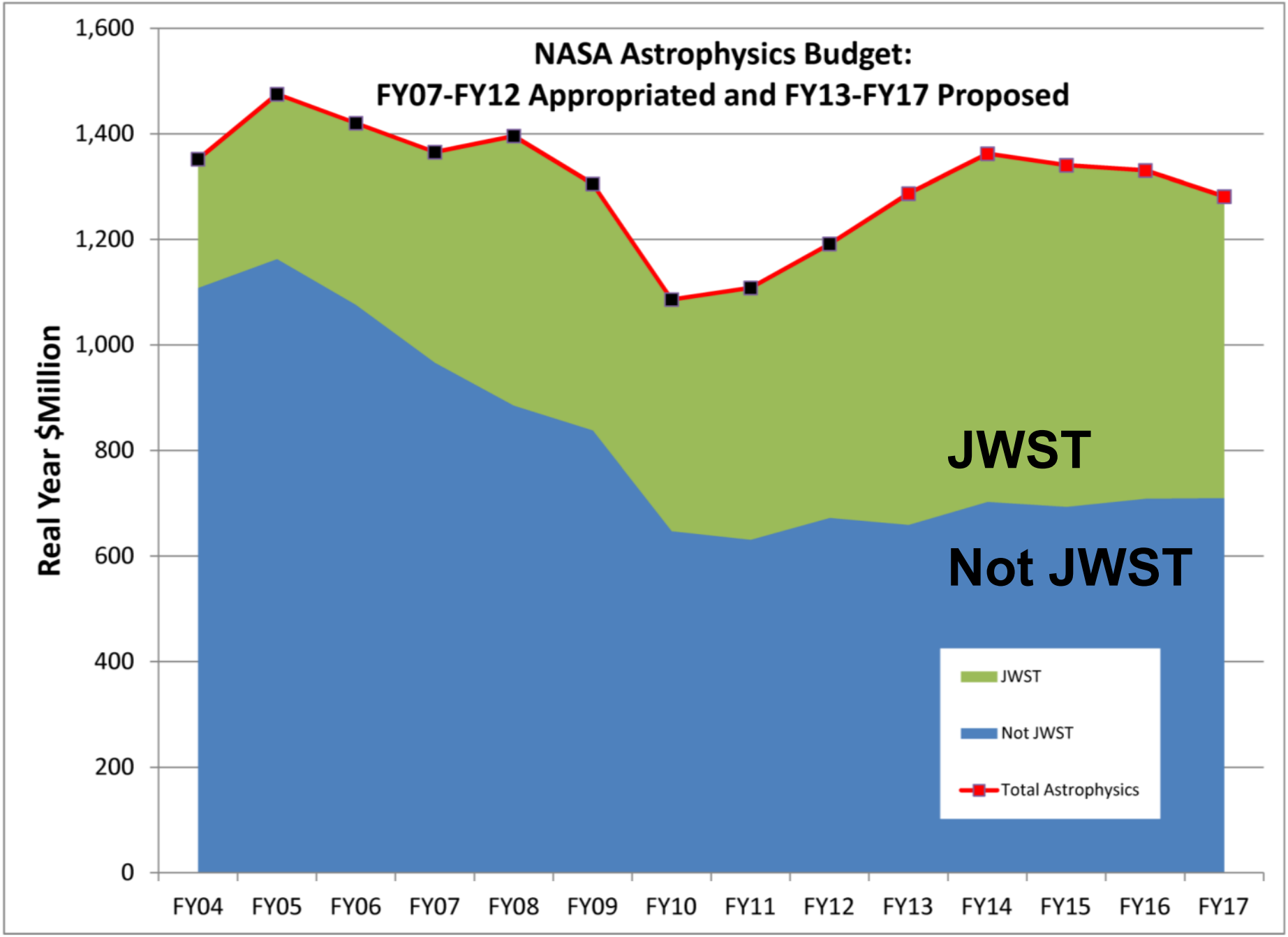
www.nasa.gov

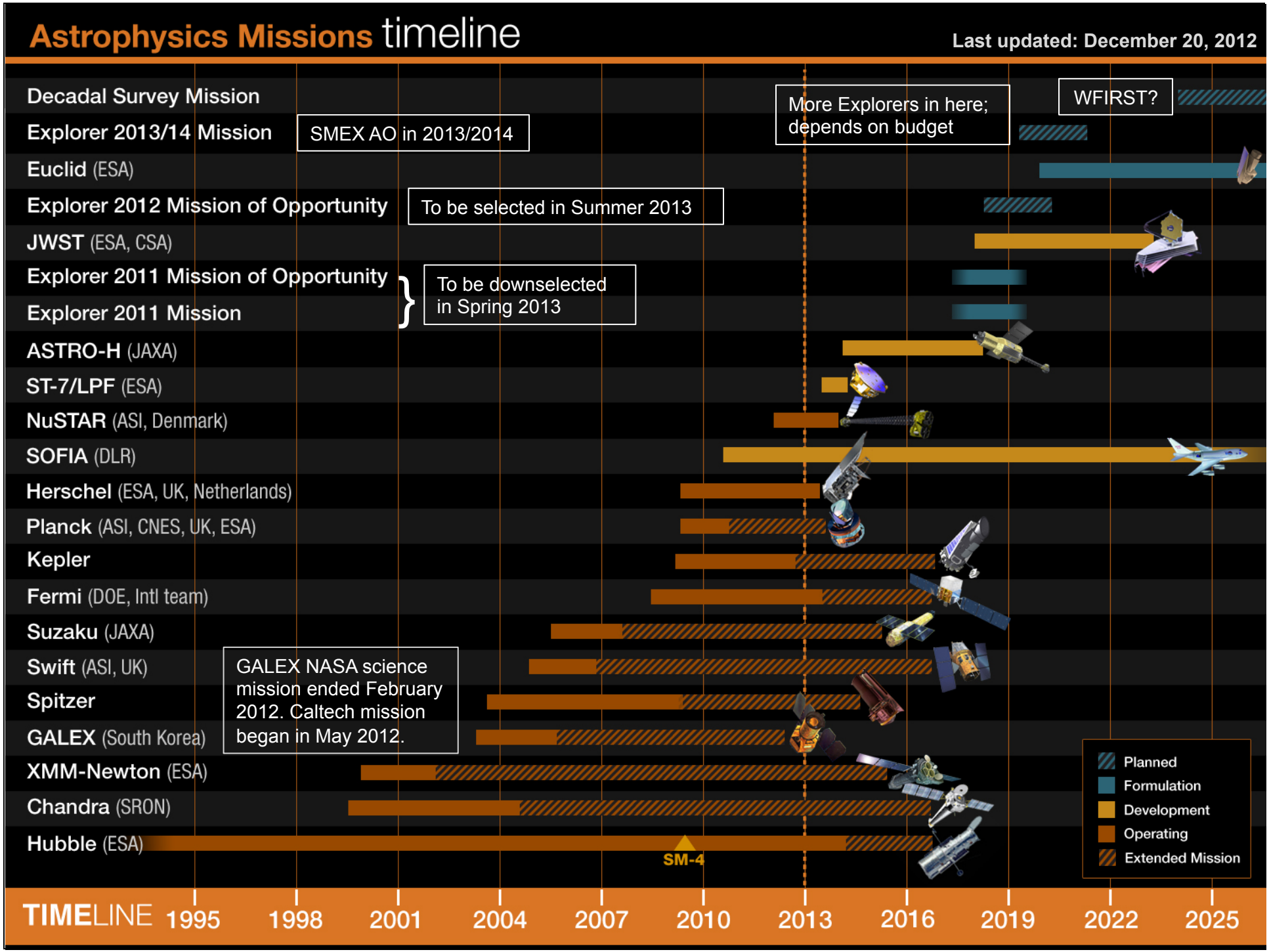
This presentation is posted at
http://science.nasa.gov/astrophysics/documents/

The Big Picture…..

- **This is a time of opportunity for NASA Astrophysics**
  - The total Astrophysics budget is at a high level.
  - Large and small space-based observatories spanning the electromagnetic spectrum are currently studying the universe.
  - The James Webb Space Telescope, the highest priority of the community, is on schedule for an October 2018 launch.
  - Astounding suborbital-class investigations are being conducted on sounding rockets, balloons, and the International Space Station.
  - Individual investigators are leading data analysis, theory, and technology development projects selected through open, competitive, peer reviewed solicitations.
  - We are preparing for the strategic mission that will be developed following JWST.

- **The budgetary future is uncertain**
  - “If you can’t live with uncertainty, please don’t come to work at NASA Headquarters.” (Paul Hertz, quoted in Space News, 2012 Nov 11 issue)


NASA Astrophysics Budget:
FY07-FY12 Appropriated and FY13-FY17 Proposed
Real Year $Million
1,600
1,400
1,200
1,000
800
600
400
200
0
FY04
FY05
FY06
FY07
FY08
FY09
FY10
FY11
FY12
FY13
FY14
FY15
FY16
FY17
JWST
Not JWST
JWST
Not JWST
Total Astrophysics


Astrophysics Missions timeline
Last updated: December 20, 2012
Decadal Survey Mission
Explorer 2013/14 Mission
SMEX AO in 2013/2014
More Explorers in here; depends on budget
WFIRST?
Euclid (ESA)
Explorer 2012 Mission of Opportunity
To be selected in Summer 2013
JWST (ESA, CSA)
Explorer 2011 Mission of Opportunity
Explorer 2011 Mission
To be downselected in Spring 2013
ASTRO-H (JAXA)
ST-7/LPF (ESA)
NuSTAR (ASI, Denmark)
SOFIA (DLR)
Herschel (ESA, UK, Netherlands)
Planck (ASI, CNES, UK, ESA)
Kepler
Fermi (DOE, Intl team)
Suzaku (JAXA)
Swift (ASI, UK)
GALEX NASA science mission ended February 2012. Caltech mission began in May 2012.
Spitzer
GALEX (South Korea)
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

Visiting Scientists at NASA HQ

Looking for a few good astrophysicists….

- Seeking one or more experienced scientists
  - to take leave from their U.S. home institution
  - for a 2-year visiting position (can extend up to 6 years)
  - to work in Astrophysics at NASA Headquarters
- Duties include management of the Astrophysics grants programs; planning, development, and management of NASA missions; strategic planning for the future of NASA astrophysics.
- Requires Ph.D. or equivalent, relevant research experience, familiarity with NASA research award programs and/or missions, and the ability to communicate effectively.
- Of particular interest is expertise in high energy astrophysics; in science, instrumentation and technology for the far-infrared, and for ultraviolet/visible/near-infrared wavebands; and in the science of the WFIRST mission.
- For additional info, talk with any of the Astrophysics HQ staff.

Apply by January 31, 2013

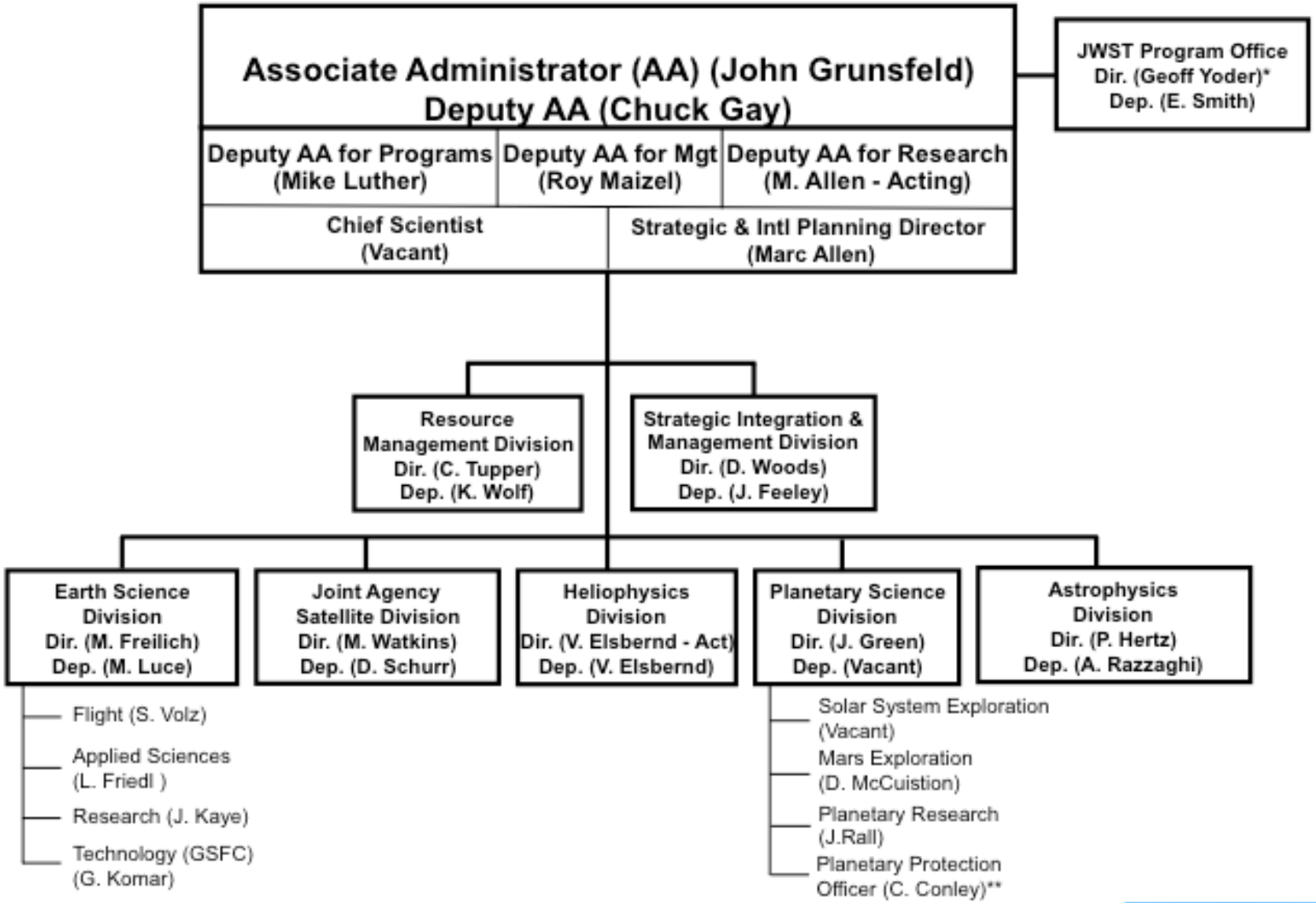
http://jobregister.aas.org/job_view?JobID=43854

Astrophysics Division Organization

Presented at the NASA Town Hall
January 8, 2013

Paul Hertz
Director, Astrophysics Division

SMD Organization



Astrophysics Division Organization Chart

January 3, 2013

Resource Management
Omana Cawthon +
Peifen Anawalt +

Director
Paul Hertz
Deputy Director
Andrea Razzaghi

Lead Secretary: Leslie Allen (acting)
Secretary: Christie Ashley *
Program Support Specialist: Sheila Gorham

Cross Cutting

Technology Lead: William (Billy) Lightsey *
Strategic Integration: Joan Centrella *
Division E/PO POC: Hashima Hasan (Lead Comm Team)
Division PAO POC: Ilana Harrus *
Information Manager: Lisa Wainio *

Astrophysics Research

Program Manager: Linda Sparke
Astrophysics Data Analysis: Doug Hudgins, Debra Wallace
Astrophysics Theory: Linda Sparke
Origins of Solar Systems: Larry Petro *
APRA lead: Ilana Harrus *
Cosmic Rays, Fundamental Physics: Joan Centrella*, Vernon Jones, Keith MacGregor*
Gamma Ray/X-ray: Michael Garcia*, Ilana Harrus* Lou Kaluzienski, Wilt Sanders*
Optical/Ultraviolet: Michael Garcia, Richard Griffiths, Hashima Hasan, Mario Perez *, Larry Petro *
IR/Submillimeter/Radio: Richard Griffiths, Doug Hudgins, Larry Petro, 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)		
LEADS	**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)		
LEADS	**Michael Garcia ***	**John Gagosian**
Herschel	Glenn Wahlgren *	John Gagosian
Hubble	Richard Griffiths *	John Gagosian
JWST	Hashima Hasan	N/A
SOFIA	Glenn Wahlgren *	John Gagosian
Spitzer	Glenn Wahlgren *	John Gagosian
Physics of the Cosmos (PCOS)		
LEADS	**Richard Griffiths ***	Lia LaPiana
Chandra	Wilt Sanders *	Lia LaPiana
Euclid	Richard Griffiths *	Lia LaPiana
Fermi	Ilana Harrus *	Lia LaPiana
Planck	Joan Centrella *	Lia LaPiana
ST-7/LPF	Wilt Sanders *	Anne-Marie Novo-Gradac
XMM-Newton	Lou Kaluzienski	Lia LaPiana
Astrophysics Explorers (APEX)		
LEADS	**Wilt Sanders ***	**Anne-Marie Novo-Gradac**
Astro-H	Lou Kaluzienski	Anne-Marie Novo-Gradac
GALEX	Larry Petro *	Anne-Marie Novo-Gradac
NuSTAR	Lou Kaluzienski	Mark Sistilli
Suzaku	Lou Kaluzienski	Anne-Marie Novo-Gradac
Swift	Ilana Harrus *	Anne-Marie Novo-Gradac
WISE	Hashima Hasan	Anne-Marie Novo-Gradac
WMAP	Joan Centrella *	Anne-Marie Novo-Gradac

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

Kelly Johnson on detail until Aug. 2013.
Rita Sambruna on detail until Sept. 2013

Astrophysics PAGs

NASA Advisory Council (NAC)	→ NASA / Charlie Bolden
Science Committee	→ SMD / John Grunsfeld
Astrophysics Subcommittee	→ Astrophysics / Paul Hertz

COPAG	ExoPAG	PhysPAG
COPAG SAGs include: • Science objectives for a 4m–8m UV/Optical mission • Technologies for a 4m-class monolithic telescope UV/Optical mission with internal coronagraph • Technologies for an 8m-class segmented telescope UV/Optical mission with external occulter • Technologies for a future far-IR mission • Science objectives and technology requirements for a series of Cosmic Origins Probes	**ExoPAG SAGs include:** • Potential for exoplanet science measurements from solar system probes • Planetary measurements needed for exoplanet characterization • Exoplanet flagship requirements and characteristics • State of precision RV measurements for planetary census • Exoplanet probe requirements and characteristics	**PhysPAG SAGs include:** • Cosmic Ray Study Analysis Group • Gamma-ray Study Analysis Group • Gravitational Wave Study Analysis Group • X-ray Study Analysis Group

Table 2—Analysis Groups. *Structure of Program Analysis Groups (PAGs) and Study Analysis Groups (SAGs) reporting to the Astrophysics Subcommittee.*

Astrophysics PAGs

PhysPAG

- Met Aug 14-16 in Washington DC. Heard reports from X-ray and Gravitational Wave Community Science Teams; discussed PCOS-related ESA missions; meetings of all SAGs plus dark energy breakout.
- Current chair (Steve Ritz) rotating off in Feb 2013; nominations for new ApS members requested via NSPIRES, closed Nov 14, 2012.
- TechSAG completed its assessment of the near-term and long-term PCOS technology needs. The report was used to formulate the Program Annual Technology Report (PATR) Released in October 2012.
- Five active SAGs: Inflation Probe, Gravitational Wave, X-ray, Gamma ray, and Cosmic ray SAG.
- PhysPAG website: **http://pcos.gsfc.nasa.gov/physpag.php**

COPAG

- Met Sept 18-19 at STScI. Discussed science goals and possible mission concepts resulting from RFI #1, "Science Objectives and Requirements for the Next NASA UV/Visible Astrophysics Mission Concepts"
- Current chair (Chris Martin) rotating off in Feb 2013; nominations for new ApS members requested via NSPIRES, closed Nov 14, 2012.
- Five active SAGs: Science objectives for a 4m–8m UV/Visible mission, Technologies for a 4m-class monolithic telescope UV/Visible mission w/internal coronagraph, Technologies for an 8m-class segmented telescope UV/Visible mission w/external occulter, Technologies for a future far-IR mission, and Science objectives & technology requirements for a series of Cosmic Origins Probes.
- COPAG websites: **http://cor.gsfc.nasa.gov** and **http://copag.pbworks.com/**

ExoPAG

- Met Oct 13-14 at DPS meeting in Reno NV. Held mini-workshops on near-term opportunities for exoplanet characterization and the future of precision RV measurements and their importance to NASA.
- Current Dear Colleague is out soliciting nominations to serve on the ExoPAG Executive Committee; deadline for nominations is February 1, 2013.
- Three active SAGs: ExoPlanet Flagship Requirements and Characteristics; Planetary Measurements Needed for Exoplanet Characterization; State of Precision RV measurements for planetary census.
- ExoPAG website: **http://exep.jpl.nasa.gov/exopag/**

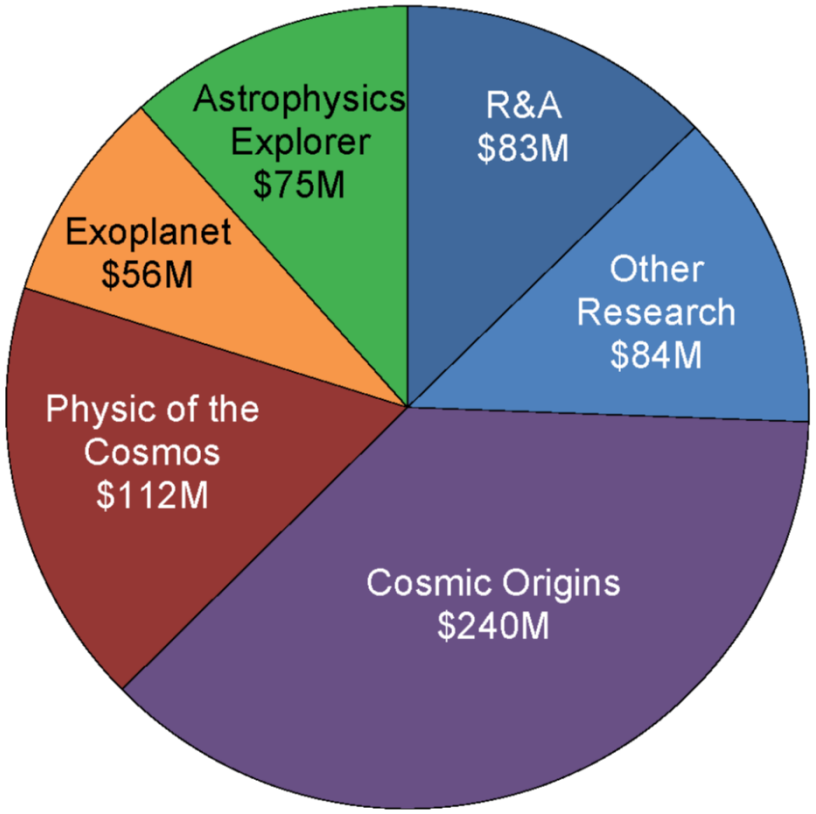
Astrophysics Division Update

Presented at the NASA Town Hall
January 8, 2013

Paul Hertz
Director, Astrophysics Division

FY2013 President's Budget

Total FY13 Budget (excluding JWST)*
$649M



* Final funding levels pending an FY13 appropriation by Congress and the concurrence of Congress on NASA's initial FY13 operating plan

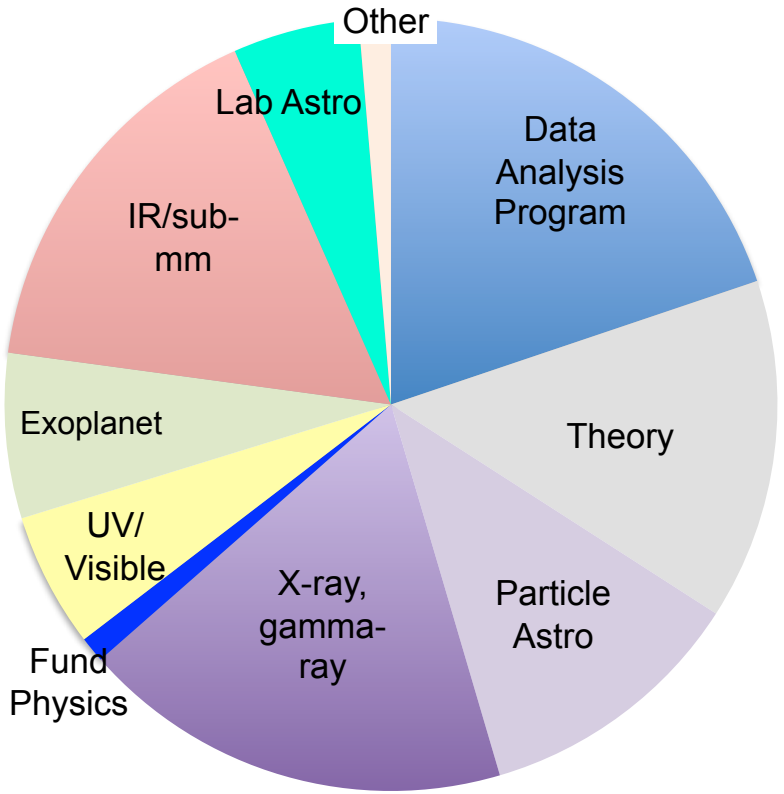
- Astrophysics Research includes:
  - R&A Programs (APRA, ADAP, ATP, OSS, RTF, TCAN)
  - Research Support: Balloon Program, Astrophysics Data Archives, Senior Review Wedge
- Cosmic Origins includes:
  - Hubble, SOFIA, Herschel, Spitzer, technology development
- Physics of the Cosmos includes:
  - Chandra, Fermi, Planck, XMM, LPF, Euclid, technology development
- Exoplanet Exploration includes:
  - WFIRST, Kepler, Keck Ops, LBTI, technology development
- Astrophysics Explorer includes:
  - Astro-H, NuSTAR, Swift, WISE, WMAP, Suzaku, GALEX, EX-1 and EX-MO, future Explorers

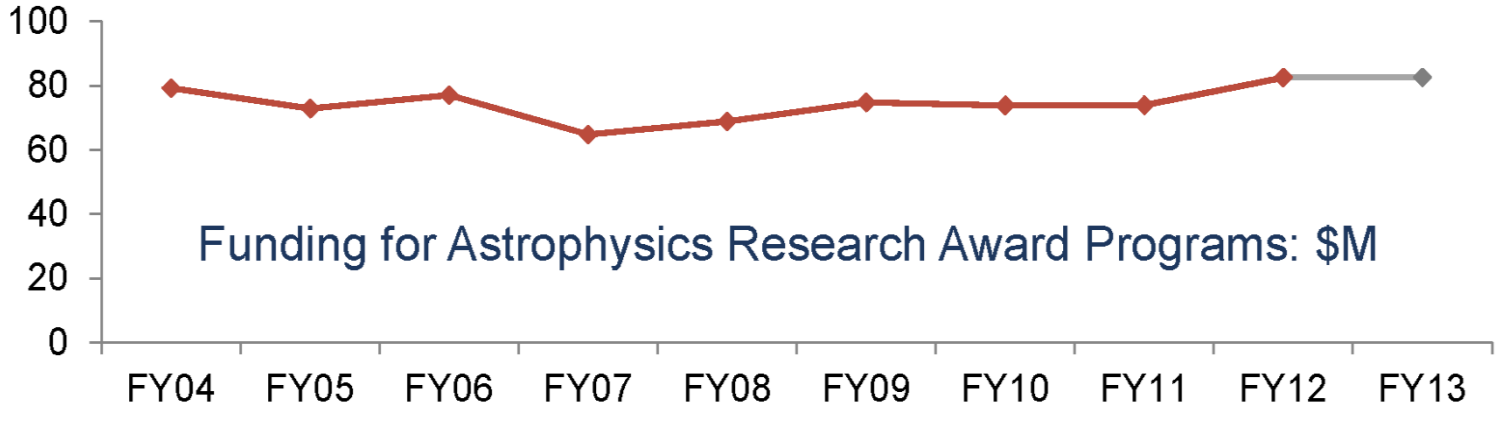
Astrophysics Research Awards

Most recent competitions:

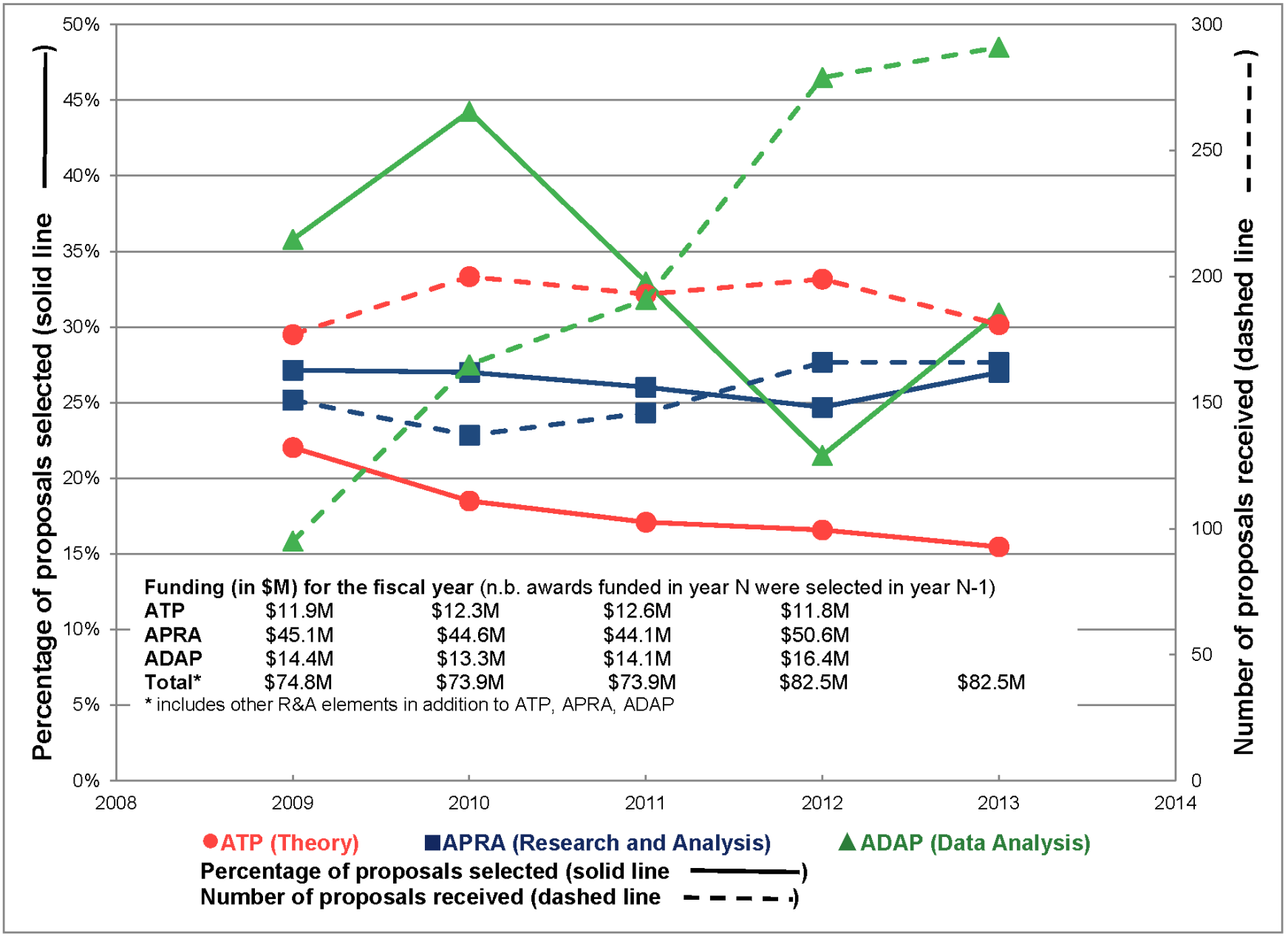
	Proposals Rec'd	Year-1 $M	Success
RTF-11	16	0.6	19%
APRA-11	162	12	27%
SAT-11	48	8	21%
ADAP-12	291	9	31%
OSS-12	46	2	26%
ATP-12	181	4	15%

Split of $82.562M spent in FY12
PI Award programs plus management overhead





Astrophysics R&A Funding Trends



Funding Opportunities in 2013

- **ROSES-13 is currently planned for release on February 14, 2013**
  - Delay in release of the President's budget may cause a delay in the release of ROSES-13
  - All solicitations are subject to availability of budget; the President's FY13 budget request (not yet appropriated by Congress) includes a 1.8% increase for R&A
  - Caveats: No FY13 appropriation, possible sequestration, no FY14 budget request
- **ROSES-13 will include the usual Astrophysics R&A and GO solicitations:**
- **Due Dates will be about the same time as last year. Upcoming 2013 due dates:**

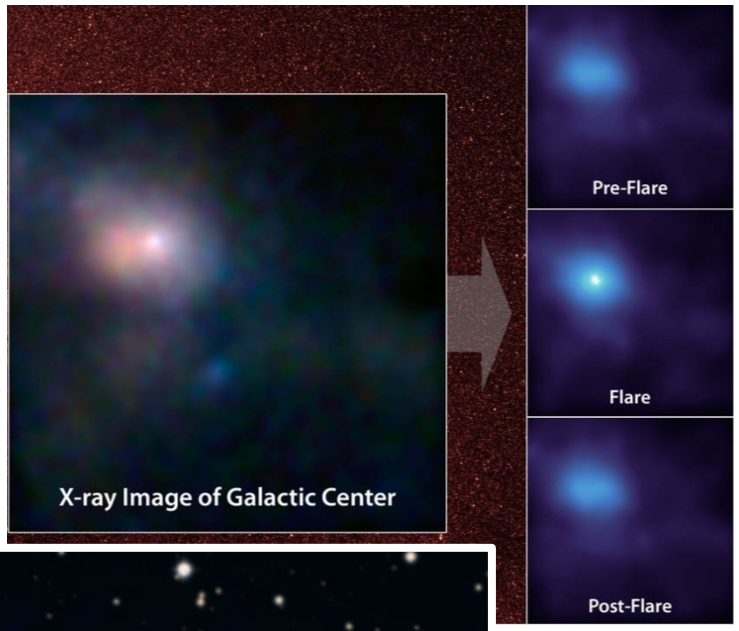
January 18, 2013	Fermi Guest Investigator -- Cycle 6	
January 18, 2013	Kepler Guest Observer -- Cycle 5	ROSES-12
February 14, 2013	Theory and Computational Astrophysics Networks (via NSF FastLane)	ROSES-12
March 1, 2013	Kepler Participating Scientist Program	ROSES-12
March 22, 2013	Astrophysics Research and Analysis: APRA-12 Strategic Astrophysics Technology: SAT-12	ROSES-12
May 17, 2013	Astrophysics Data Analysis: ADAP-13	
May 23, 2013	Origins of Solar Systems: OSS-13	ROSES-13
July 12, 2013	Astrophysics Theory Program: ATP-13	ROSES-13
September 26, 2013	Swift Guest Investigator -- Cycle 10	ROSES-13
November 1, 2013	Nancy Grace Roman Technology Fellowships for early career researchers (RTF-13)	ROSES-13

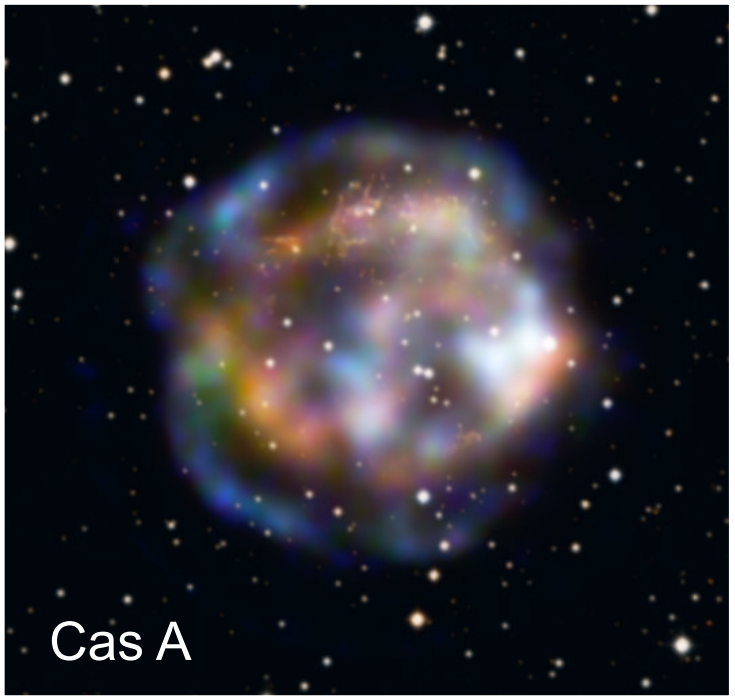
New Opportunity: TCAN
Theory & Computational Astrophysics Networks

- Astro2010 recommended that NASA, NSF, and DoE jointly provide awards to Theory and Computation Networks that address major theoretical questions raised in Astro2010 that are ripe for a breakthrough.
- **Theoretical and Computational Astrophysics Networks (TCAN) is a joint program with NSF.**
  - The text of this solicitation can be found on the NSF web page at http://go.usa.gov/Yehz
  - Information for NASA proposers is in Appendix D.12 of ROSES-12.
  - All proposals must be submitted via NSF's FastLane at https://www.fastlane.nsf.gov/
  - Proposers and their institutions must be registered in FastLane for proposal submission.
- **The window for proposal submission on FastLane opens on February 1, 2013 and closes on February 14, 2013 at 5 pm local time for the proposer.**
  - The NASA point of contact for TCAN, Joan Centrella, can be reached at Joan.Centrella@nasa.gov or (202) 358-2522.
    - **Joan will be available at the NASA Booth this afternoon 2:30 – 3:30 pm for contact about the TCAN opportunity.**
  - The NSF point of contact for TCAN, Thomas Statler, can be reached at tstatler@nsf.gov or (703) 292-4910.

Program Update - NuSTAR

- 2-year Prime Mission started Aug 1, 2012.
- Early pointing and alignment issues have largely been mitigated.
  - Unexpected thermal displacements of both the star tracker camera head units and mast structure.
  - Initial alignment of star cameras was off by ~4mm instead of the planned 1mm.
- Science observations proceeding well.
- NuSTAR working with other missions for coordinated observations (e.g., viewing 3C273 along with Chandra, XMM-Newton, Swift, Suzaku, and INTEGRAL).
- Multiple results being reported at AAS (Session 209) including:
  - Cas A: 10-30keV images constrain shock acceleration
  - ULXs: high energy spectra imply super-Eddington accretion



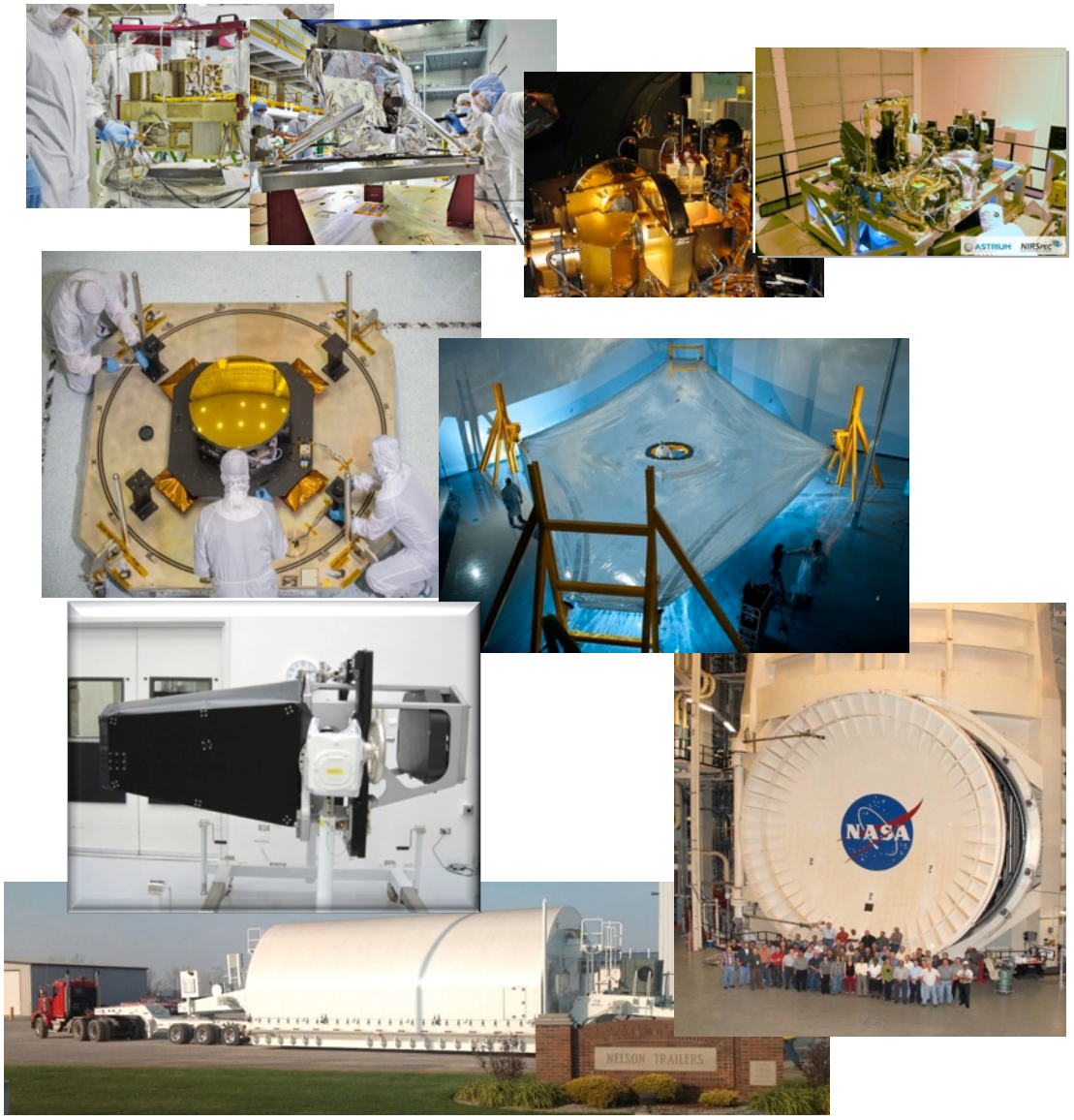


Blue:15-20 keV
Green: 8-10 keV
Red: 4.5-5.5 keV

Program Update - JWST

JWST 2012 Progress

- 2 of 4 flight instruments delivered
- Other 2 instruments in cryo-vac testing right now, delivery this Summer
- 3 primary mirror segments and secondary mirror delivered
- All Aft Optics System testing completed
- 3 of 5 engineering template sunshields complete, 1 nearly complete, 1 being assembled
- Modifications to JSC chamber A completed and test objectives met
- Ground and air transport container for Observatory delivered



On Schedule for October 2018 launch

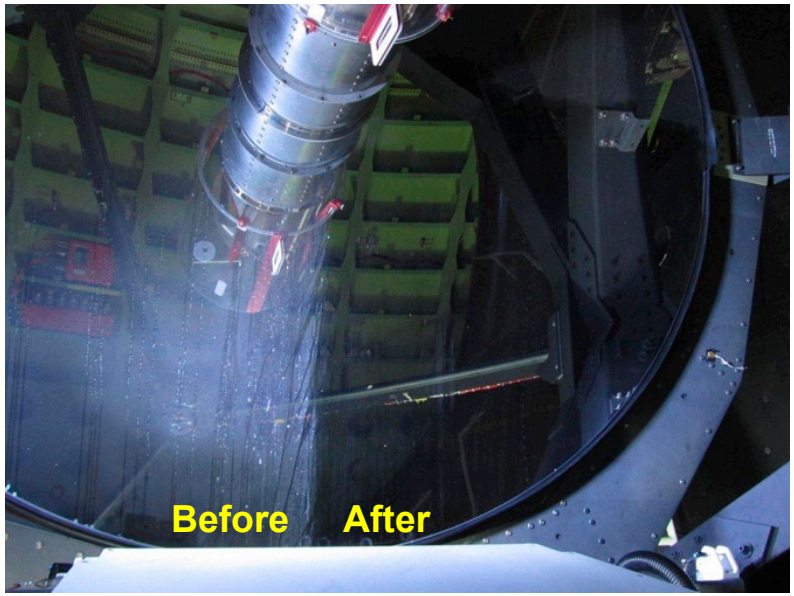
How To Stay Current on JWST

- Mission status
  - http://www.jwst.nasa.gov/ (navigation links on left, “Status”)
- Hardware images and videos
  - http://www.flickr.com/photos/nasawebbtelescope/
  - http://www.youtube.com/user/NASAWebbTelescope
- Exposure time estimators
  - http://jwstetc.stsci.edu/etc/

JWST Town Hall (Session 318) on Wednesday at 12:45 in Rm 104A

Program Update - SOFIA

- Selected upgraded HAWC+ instrument proposal to provide polarimetry at far-IR wavelengths and larger detector format.
- Selected Cycle 1 Science Investigations for CY2013 general observer campaign.
  - GO science to begin in late Spring 2013
  - Includes first southern hemisphere deployment
- Published first science results in Spring 2012 special issues of A&A and ApJ.
- Performed observatory upgrades:
  - Completed installation of upgraded cockpit avionics system.
  - Completed Water Wash of telescope mirrors with significant improvement in optical properties.
  - Implemented comprehensive improvements to the on-board mission communications and control systems.
- Upgraded Focal Plane Imager installed in early CY2013 followed by instrument commissioning.
- **NASA SOFIA Town Hall (session 319) on Wednesday at 12:45pm in Room 104B.**

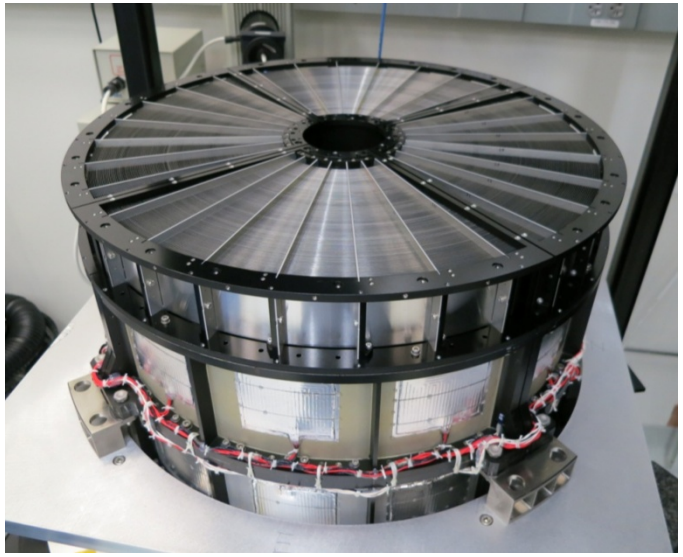


SOFIA Primary Mirror Water Wash Results

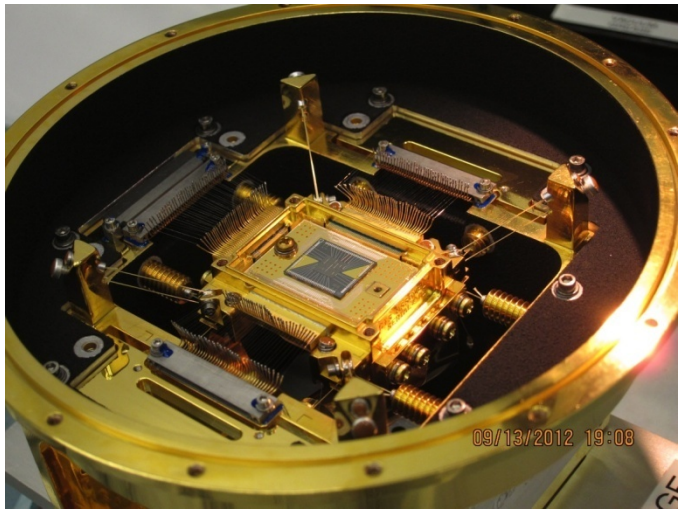
Avionics Check Flight Dec. 3, 2012

Program Update - Astro-H

- Cryogenic performance testing of engineering model instrument in JAXA engineering model dewar concluded December 13, 2012.
  - Engineering model detector verified to have 5 eV resolution (7eV requirement).
  - Vibration issue identified with dewar cryocoolers affects detector resolution while cryocoolers are operating. Engineering solution by JAXA is in work.
  - New design for NASA heat switches has been finalized and rigorous qualification program has been developed.
- Both the flight model detector and flight spare detector have completed fabrication and have resolution < 5 eV.
  - The flight model has completed environmental test and is now in calibration. The flight spare has completed vibration testing.
- Flight model mirror has demonstrated ~1.13 arcmin resolution (1.7 arcmin requirement).
  - Flight model mirror has completed x-ray performance testing
  - JAXA precollimator installed.



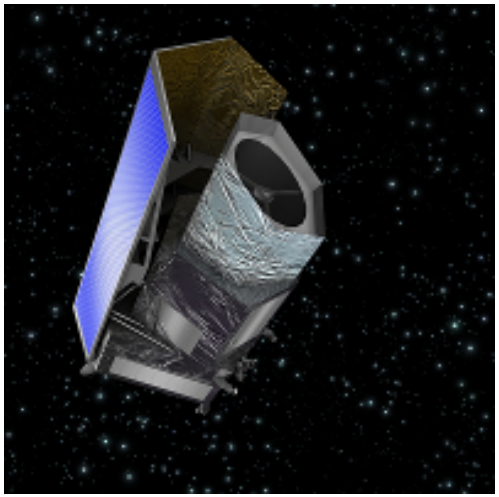
FM X-ray mirror with JAXA precollimator



Astro-H SXS flight model X-ray detector.

Program Update - Euclid

- **The ESA Council approved the NASA-ESA MOU on Euclid.**
  - ESA has awarded engineering contract to Teledyne for demonstration of H2RG sensors that meet Euclid's requirements
  - ESA launch date is early 2020
- **NASA's portion of the project approved to enter Phase B on Dec. 21, 2012.**
  - NASA is providing the flight sensor chip subsystems (SCS or triplet) for the Euclid NISP instrument; SCS consists of H2RG sensor chip subassembly, SIDECAR ASIC, and flex-cable
  - NASA Euclid project is at JPL
  - Characterization of SCS will be done at GSFC
  - NASA Confirmation is planned for late Summer 2013



- **NASA has selected 3 proposals for Euclid science investigations**
  - NASA has selected Jason Rhodes (JPL) as U.S. National Lead for Euclid; Rhodes also appointed to Euclid Consortium Board and ESA Euclid Science Team
  - NASA has nominated to ESA 40 members of the Euclid Consortium
  - These are only nominations and ESA/Euclid Consortium Board will make the appointments

Program Update – WFIRST

- **WFIRST Science Definition Team (SDT) delivered its final report in August 2012**
  - First Design Reference Mission (DRM1) is a proof of concept that a mission can be constructed that is compliant with the Astro2010 recommendation. [1.3m mirror, current technology detectors, 5 year mission]
  - Second Design Reference Mission (DRM2) does not duplicate capabilities of Euclid, LSST, and JWST in advancing science objectives of WFIRST and looks for cost savings. [1.1 m mirror, evolved technology detectors, 3 year mission]
  - 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.
- **Astrophysics Focused Telescope Assets (AFTA) SDT studying use of 2.4m telescope assets for advancing the science objectives of WFIRST**
  - See next slide
- **WFIRST Study Office at GSFC is continuing to revise DRM and study trades**
- **NASA is investing in evolved detector technology through the competitive SAT program**
  - Enable the continued maturation of the H4RG-10 near-IR detector array to TRL-5
  - Achieve HgCdTe detector design/process improvements that will benefit WFIRST and other applications

http://wfirst.gsfc.nasa.gov/

Astrophysics Focused Telescope Assets (AFTA) Study

- **In June 2012, NASA announced that it had acquired the use of two sets of 2.4m space-qualified telescope optics systems and supporting components.**
- **A seven month study is underway to assess the use of the 2.4m telescope assets for a mission that can accomplish the WFIRST science.**
  - Study started in October 2012 and will be completed by May 2013.
  - Schedule and cost estimate to be developed and completed by May 2013.
- **Science Definition Team (SDT) formed to support study activities at GSFC and develop a Design Reference Mission (DRM).**
  - Co-Chairs, David Spergel (Princeton U.) and Neil Gehrels (GSFC).
- **SDT report, including DRM, due April 30, 2013.**
  - Study to include an option to add a coronagraph for exoplanet science as an example of a secondary
- **SDT report will inform NASA's decision on future use of the telescope assets**
- **WFIRST and AFTA Special Session on Tuesday 7:00 pm in Room 101A**

http://wfirst.gsfc.nasa.gov/science/

Mock up of the 2.4m telescope now located at GSFC

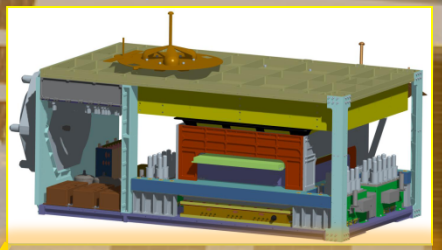
Study on Applications of Large Space Optics (SALSO)

- In June 2012, NASA announced that it had acquired the use of two sets of 2.4m space-qualified telescope optics systems and supporting components.
- Although their most obvious applications are in astrophysics, **NASA is interested in identifying possible uses for these systems to address a broader range of its science, exploration, and technology goals.**
  - In November 2012, NASA released an RFI soliciting broad community inputs focused on utilization of the telescope assets for Agency goals aligned with 5 principal areas: space technology, human exploration and operations, heliophysics, planetary science, and astrophysics (excluding a wide field infrared survey). (Responses were due January 7, 2013)
  - A workshop will be held February 5-6, 2013, in Huntsville AL to provide a forum for concept presentation and discussion of innovative ideas.
  - This will be followed by additional study by NASA of representative concepts presented at the workshop. Related presentations may be combined for use as input to this additional analysis.
- **NASA will use all of the information gathered to formulate and evaluate future strategies for utilizing the assets to advance Agency goals.**
  - A final study report will contain the workshop briefings and the results of follow-on analyses. This report will be completed about May 2013 and publicly released thereafter.

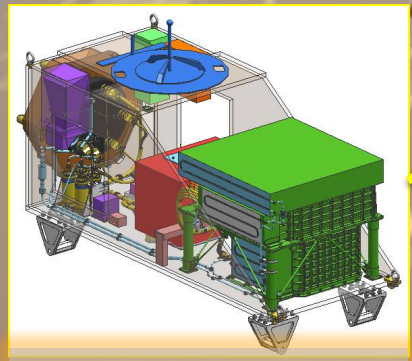
http://science.nasa.gov/salso/

Astrophysics on the ISS: A Cosmic-ray Observatory

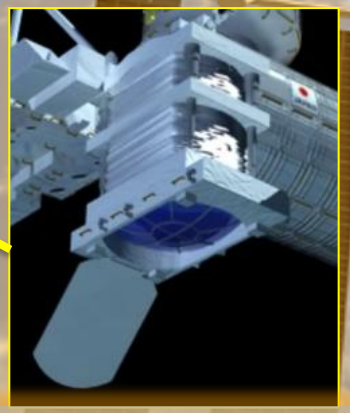
AMS Launch
May 16, 2011



ISS-CREAM
Sp-X Launch 2014



CALET on JEM
HTV Launch 2014



JEM-EUSO
Launch Tentatively
planned for 2017

Explorer Program

- The Astro2010 Decadal Survey stated that "NASA should support the selection of two new astrophysics MIDEX missions, two new astrophysics SMEX missions, and at least four astrophysics MoOs over the coming decade."
- **The Astrophysics Explorer budget has been significantly augmented to enable selection of 4 PI-led missions and 4 PI-led Missions of Opportunity (MOs) over a decade.**
  - NASA will downselect in Spring 2013 one mission and one MO from the projects currently conducting Phase A studies (FINESSE/TESS, GUSSTO/NICER).
  - NASA will select in Summer 2013 one (or more) MO from the proposals received in December 2012.
- **Astrophysics Division is planning a series of AOs (subject to budget approval):**
  - An AO for a SMEX in late-2013/early 2014 with the cost caps and dates TBD (no MO call in this AO – the late 2012 MO solicitation was the associated MO call).
  - An AO for an EX and MO in 2015.
  - AOs, each for a mission and MO, will be approximately 2.5 years apart (4 per decade), subject to budget availability.

Astrophysics E/PO Portfolio

- **Astrophysics Science Education and Public Outreach Forum (SEPOF)** can help you share your science with educators, students, or the public (see http://smdepo.org/node/305).
  - Contact address: AstroForum@stsci.edu
- **Program Offices:** *Develop thematic initiatives reflecting the science and technology of the individual missions and the overall thematic elements of the program.*
  - PCOS and COR Program Offices are developing coordinated approach to PCOS and COR science E/PO
  - Exoplanet Exploration Program Office has an established E/PO program which has been updated to reflect the current program
  - Provide infrastructure for smaller E/PO efforts
- **Flight Missions**
  - Every mission is required to have an E/PO plan
  - Oversight provided by HQ Program Scientist, Program Executive, Astrophysics E/PO Lead
- **Education and Public Outreach for Earth and Space Science (EPOESS)**
  - Competed through ROSES and funded by SMD
  - Oversight provided by SMD and Astrophysics E/PO Lead

Astrophysics E/PO Presentation *by Hashima Hasan, #302.05, Jan. 9 at 10:40 a.m.*

Astrophysics Division Implementation Plan

Presented at the NASA Town Hall
January 8, 2013

Paul Hertz
Director, Astrophysics Division

Astrophysics Division Responsibilities

- **The Astrophysics Division is responsible for the stewardship of the Nation's capabilities in space astrophysics and for advancing the Nation's space astrophysics goals and objectives.**
- **The guiding principles used by the Division in implementing its strategy for meeting those responsibilities include:**
  - Enable the science and priorities given by the Decadal Survey with new activities as well as through ongoing missions, including large missions, medium missions, and Explorers.
  - Invest in the Astrophysics Research Program for developing the science cases and technologies of new missions and for maximizing the scientific return from operating missions.
  - Receive community input and advice through the APS and its associated PAGs, the CAA, and the AAAC, and use this input and advice to inform decisions made by the Division.
  - Implement the program through choices made by the Astrophysics Division in the context of the science and priorities set by the Decadal Survey, and work with the Science Mission Directorate, NASA Administrators office, and White House Office of Management and Budget (OMB) to move those choices into budget realities.
  - Use processes that are as transparent as possible.
  - Preserve and nurture core capabilities at NASA Centers and throughout the Nation.
  - Maintain flexibility needed in an environment that is constantly changing.

Astrophysics Budget Reality

- **There is inadequate available budget to implement the Astro2010 Decadal Survey recommendations as written; there is also changed external context.**
  - JWST was rebaselined for a 2018 launch with an increased cost commitment LCC of $8.8B, an increase of $3.1B.
  - Although the total funding for astrophysics is higher than the Decadal Survey assumed, the increased cost of JWST has left insufficient funding over the decade to address the Decadal Survey recommendations for new projects and activities.
  - Due to budget constraints, no new astrophysics missions other than Explorers can enter formulation before FY17, when JWST approaches launch.
  - NASA and ESA have ended the joint LISA and IXO studies.
  - NASA has committed to a partnership with ESA on Euclid.
  - NASA is considering whether the NRO 2.4m telescope assets can enable astrophysics priorities or other NASA objectives.
- **Large strategic missions in the future are possible only with the Astrophysics budget that is freed up as JWST spending begins to decrease in FY17 and out.**
  - A new strategic mission can be started as early as FY17 subject to available funding.

Astrophysics Near-term Goal and Strategy

- **The 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 the science during the interim.**
  - It cannot be assumed that the authority to start a new large mission (i.e., WFIRST) will be granted in 2017, therefore concepts for moderate cost missions, probes that cost no more than approximately $1B, must also be considered.
  - Any mission concept studied must derive from the science objectives of the Decadal Survey's prioritized activities.
- **The strategy is to use the science and prioritized activities 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.
- **In order to prepare for a new strategic mission**
  - A near term program of mission concept studies and technology development will be undertaken
  - These studies will inform a mid-decade decision on which mission will begin formulation starting as early as FY17.

Astrophysics FY 2013 Budget Request

- **The President's FY 2013 budget request for the Astrophysics Division includes:**
  - An Astrophysics Explorer Program that can support four mission selections and four Missions of Opportunity (MO) selections over a decade (depending on the cost caps chosen and launch vehicle availability).
  - Extensions of astrophysics operating missions and their associated GO programs.
  - Continued development and operation of the SOFIA airborne observatory.
  - A new program for mid-TRL level technology development (the Strategic Astrophysics Technology (SAT) program element in ROSES).
  - An augmented competitive Astrophysics Research Program that maintains growth realized in FY 2012.
  - New research opportunities: Theory and Computation Networks (in partnership with NSF), laboratory astrophysics consortia, and the Nancy Grace Roman Technology Fellowships for early career researchers.
- Following the formulation of the Presidents FY 2013 budget request and an NRC study, NASA has undertaken a partnership with ESA to provide a contribution of detector subsystems for the NISP instrument on the Euclid mission in exchange for appointing NASA-selected members in the Euclid Consortium and the Euclid Science Team.

Response to Decadal Survey

Scale	Decadal Survey Recommendation	Response included in the FY 2013 President's Budget Request
Large	WFIRST	SDT and DRMs in FY 2011 and FY 2012; AFTA study in FY 2013; technology investments in detectors through SAT program; participation in Euclid
Large	Explorer Augmentation	Augment budget to support selection of 2 EX missions, 2 SMEX missions, and 4 Missions of Opportunity over a decade; MO AO in 2012, SMEX AO in 2013/2014, and EX AO in 2015
Large	LISA	Complete ST-7/LISA Pathfinder mission; technology investments through SAT program; Community Science Team (CST) study in 2012
Large	IXO	Technology investments through SAT program; CST study in 2012; potential probe study
Medium	New Worlds Technology	Technology investments through technology testbeds and SAT program; probe studies in FY 2013 and FY 2014
Medium	Inflation Probe Technology	Technology investments through APRA program including three suborbital balloon payloads; complete Planck mission and data analysis; potential probe study after Planck results

Response to Decadal Survey

Scale	Decadal Survey Recommendation	Response included in the FY 2013 President's Budget Request
Small	Astrophysics Theory Program Augmentation	Small augmentation starting in FY 2012 and maintained
Small	(Definition of) a future UV-optical space capability	Technology investments through SAT program; science driver studies in FY 2012 and responsive mission studies in FY 2013 leading toward next decadal survey
Small	Intermediate Technology Development Augmentation	Initiated SAT program in FY 2010
Small	Laboratory Astrophysics Augmentation	Augmentation to select laboratory consortia
Small	SPICA (U.S. contributions to JAXA-led)	Not supported as a strategic contribution; candidate for Explorer Mission of Opportunity
Small	Suborbital Program Augmentation	Small augmentation for payloads; augmentation to support development of ULDB platforms and WASP
Small	Theory and Computation Networks (NASA, NSF, DOE)	Solicitation for proposals in FY 2013 (with NSF)
N/A	Additional core program augmentations	Initiated Nancy Grace Roman Technology Fellows program; small augmentation for ADAP program; small augmentation for APRA program

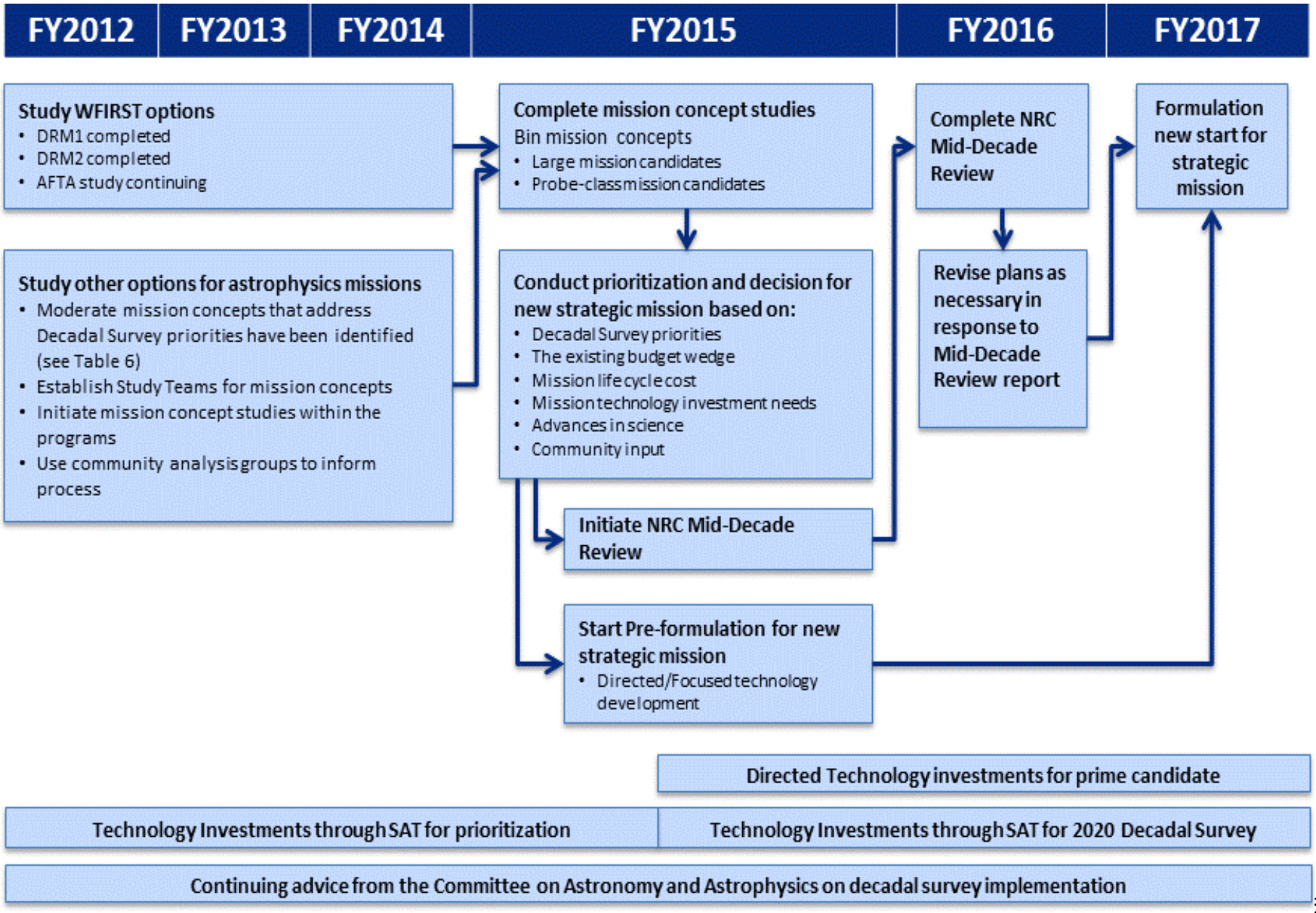
Preparing for the Next Strategic Mission

Strategic Mission Concepts	Derived from Recommendation	Status of Studies	Plan for Future
WFIRST: Large Strategic Mission (DRM1)	Large 1st : WFIRST	Completed in 2012	Candidate large mission for mid-decade
WFIRST: Probe-size Strategic Mission (DRM2)	Large 1st : WFIRST	Completed in 2012	Candidate probe for mid-decade
Use of the 2.4m telescope assets to advance the science of WFIRST (study includes an optional second instrument to advance exoplanet science)	Large 1st : WFIRST (Medium 1: New Worlds Technology)	Started in 2012	Candidate large mission for mid-decade
Gravitational Wave missions to advance the science of LISA	Large 3rd : LISA	Completed in 2012	Candidate large mission for next decade; candidate for international partnership
X-ray missions to advance the science of IXO	Large 4th : IXO	Completed in 2012; under consideration for study in 2014	Candidate probe for mid-decade; candidate large mission for next decade; candidate for international partnership
Exoplanet probes to advance the science of a planet characterization and imaging mission	Medium 1st : New Worlds Technology	Planned for 2013	Candidate probe for mid-decade; candidate large mission for next decade
Cosmic Microwave Background Polarization Probe	Medium 2nd : Inflation Probe Technology	Study under consideration for study in 2015	Candidate probe or large mission for next decade
Science and technology drivers for a UV/Visible mission	Small: (Definition of) a future UV-optical space capability	Started in 2012	Candidate probe or large mission for next decade

Exoplanet Direct Imaging STDTs

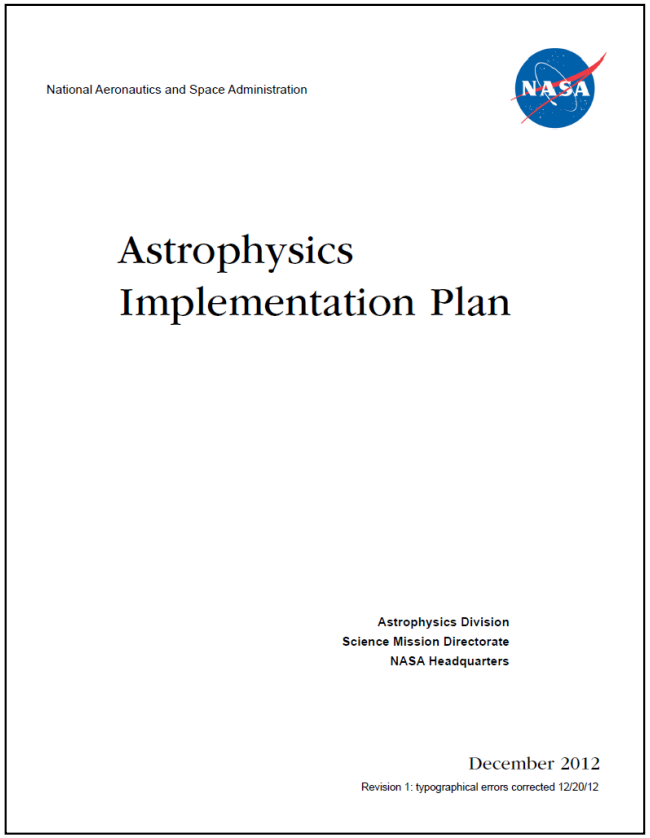
- NASA's Exoplanet Exploration Program is establishing two Science and Technology Definition Teams (STDTs) to study concepts for a potential future reduced-scale (total mission cost less than $1B) strategic exoplanet direct imaging mission.
- STDTs will explore potential probe-class implementations involving (1) an internal coronagraph and (2) an external occulter (starshade).
- Goal will be to establish science requirements, investigation approaches, key mission parameters, and to develop a credible and implementable design reference mission concept.
- **Now soliciting applications from U.S. scientists who would like to participate in one of the two Exoplanet STDTs.**
  - Additional information and instructions for applying can be found on the ExEP web site: **http://exep.jpl.nasa.gov**
  - **Deadline for applications: February 15, 2013**
- A third study may be conducted to consider probe-class mission concepts based upon indirect detection techniques that require no new technology; final decision deferred until Summer 2013.

Astrophysics Near-term Strategy



Astrophysics Implementation Plan

- **Astrophysics Implementation Plan**
  - White paper developed by Astrophysics Division
  - Describes Astrophysics Division strategy in response to the Decadal Survey recommendations
  - Consistent with current (FY13) budget guidance
  - Was discussed with the Committee on Astronomy and Astrophysics (CAA) and the NAC Astrophysics Subcommittee (APS) prior to finalization



- The Astrophysics Implementation Plan is available for download at http://science.nasa.gov/astrophysics/documents/

Astrophysics Roadmap

- **In 2013, the Astrophysics Division will develop an Astrophysics Roadmap**
  - Articulate NASA's astrophysics vision for the next 25-30 years
  - Identify notional missions & technologies necessary to enable that vision
  - Will be developed by a task force of the NAC Astrophysics Subcommittee (APS)
  - Will include community input
- **What is the difference between the Implementation Plan and the Astrophysics Roadmap?**
  - Implementation Plan describes response to 2010 Decadal Survey
  - Roadmap looks forward to and beyond the 2020 and 2030 Decadal Surveys

NASA HQ Staff at AAS Meeting

• Joan Centrella	Strategic Integration, TCAN
• Doris Daou	E/PO
• Michael Garcia	Cosmic Origins, APRA, RTF, UV/Visible
• Richard Griffiths	Physics of the Cosmos, Hubble, Euclid
• John Grunsfeld	AA, Science Mission Directorate
• Hashima Hasan	E/PO, Archives, James Webb
• Paul Hertz	Director, Astrophysics Division
• Doug Hudgins	Exoplanet Exploration, ADAP, Kepler
• Lia LaPiana	Physics of the Cosmos
• Billy Lightsey	Technology
• Keith McGregor	ATP, Fermi
• Mario Perez	Cosmic Origins, OSS, RTF
• Larry Petro	Exoplanet Exp., OSS, IR/Submillimeter
• Wilt Sanders	Explorers, Gamma/Xray, Sounding Rkts
• Eric Smith	JWST
• Linda Sparke	R&A, APRA, ATP, TCAN
• Glenn Wahlgren	Lab Astro, SOFIA, Spitzer
• Debra Wallace	ADAP

Key NASA Activities at January 2013 AAS

Saturday, Jan 5

8 am – Exoplanet Program Analysis Group, Naples Ballroom I-II (Renaissance Long Beach)

Sunday, Jan 6

8 am - Exoplanet Program Analysis Group, Naples Ballroom I-II (Renaissance Long Beach)
9 am - NASA Cosmic Origins Program Analysis Group, Beacon A (Hyatt Long Beach)
9 am - NASA Physics of the Cosmos Program Analysis Group, Beacon B (Hyatt Long Beach)
12 noon - SOFIA Tour

Monday, Jan 7

8:30 am - Kavli Lecture: Spitzer Space Telescope: Science Return and Impact, B.T. Soifer, Grand Ballroom
10 am - Science Highlights from NASA's ADAP Program I: Galactic Astrophysics, Rm 202A
12:45 pm - NASA PCOS Gravitational Wave and X-ray Astronomy Town Hall, Rm 104B
2 pm - Science Highlights from NASA's ADAP II: Extragalactic Astrophysics, Rm 202A
2 pm - Scientific Opportunities with the James Webb Space Telescope, Rm 201A
6:30 pm - NASA Kepler Mission Town Hall, Rm 104C

Tuesday, Jan 8

8:30 am – Finding the Next Earth, N. M. Batalha, Grand Ballroom
10 am - HEAD III: First Results from the NuSTAR Mission, Rm 201A
10 am – High Resolution Ultraviolet Imaging with the Hubble Space Telescope I, Rm 202A
10 am - Zeroing in on eta-Earth with NASA's Kepler Mission, Rm 104C
12:45 pm - NASA Town Hall, Rm 104A

Key NASA Activities at January 2013 AAS

Tuesday, Jan 8

12:45 pm - NASA Town Hall, Rm 104A
2 pm – High Resolution Ultraviolet Imaging with the Hubble Space Telescope II, Rm 202A
2 pm - Planets and Planetary Systems Identified by Kepler, Rm 201B
3:30 pm – Astrophysics E/PO Community Meeting, Beacon A (Hyatt Long Beach)
7 pm - WFIRST Mission and NRO Telescope, Rm 101A

Wednesday, Jan 9

8:30am - Heineman Prize: Extreme Transients in the High Energy Universe, C. Kouveliotou, Grand Ballroom
10 am – Astrophysics with Kepler's High Precision Photometry I, Rm 101A
10 am - Reports from NASA's Program Analysis Groups, Rm 102C
12:45 pm - NASA James Webb Space Telescope Town Hall, Rm 104A
12:45 pm - NASA SOFIA Town Hall Rm, 104B
2 pm – Astrophysics with Kepler's High Precision Photometry II, Rm 101A

Thursday, Jan 10

8:30 am – New Insights of Comets from the EPOXI Mission, K. J. Meech, Grand Ballroom
10 am – Kepler Exoplanets, Grand Ballroom
4:30 pm – Berkeley Prize: Results from WMAP, E. Komatsu, Grand Ballroom

This presentation is posted at
http://science.nasa.gov/astrophysics/documents/