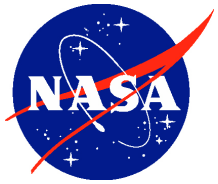



# NASA HQ Update on IXO

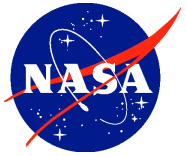
IXO Facility Science Team Meeting

Cambridge, MA

January 29, 2009

Michael Salamon

Astrophysics Division, NASA HQ




# HQ Updates

- Federal Update
- Astrophysics Update
  - Upcoming launches
  - X-ray missions
  - JDEM Update
  - IXO Update
- Decadal Update

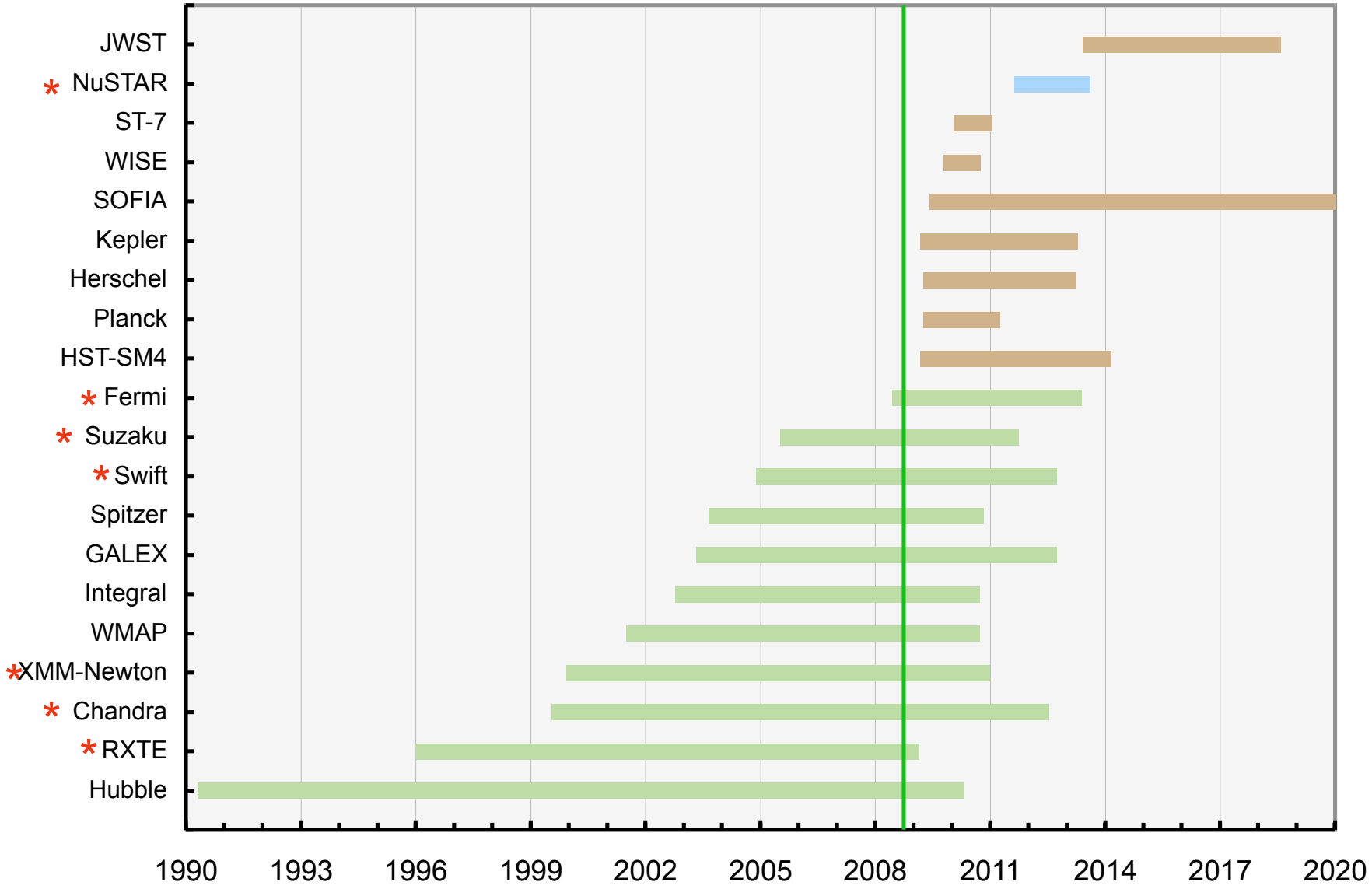
# Federal Update

- Still in Continuing Resolution, hope for a signed budget by mid-February.
- Rumors of potential candidates, but no announcement yet of new NASA Administrator. Associate Administrator Chris Scolese chosen to serve as Acting Administrator.
- American Recovery and Reinvestment Bill:
  - Original Presidential Budget FY09 request for NASA is $17.6B
  - House Appropriations Committee passes *American Recovery and Reinvestment Bill of 2009,* provides $600M to NASA: $400M for climate studies, $150M for aviation safety, $50M for Katrina damage
  - Senate Approps. Comm. version provides $1.5B, including $500M for Earth Science/climate studies.
  - Has yet to go to House/Senate Conference.

# Astrophysics Update

- Busy launch schedule for Astrophysics Division:
  - Kepler:  March 5, 2009
  - Herschel/Planck:  April 16, 20009
  - HST-SM4:  May 12, 2009
  - SOFIA first science flight:  August, 2009
  - WISE:  November 2, 2009
- X-ray missions ⇒

# Astrophysics Division Missions Operational Phase




Green: Operating, Tan: Development, Blue: Formulation

# Current and Future X-ray Missions

| Mission | Agency | Launch Year | Class |
|---|---|---|---|
| Chandra | NASA | 1999 | Great Observatory |
| Swift | NASA | 2004 | MIDEX |
| RXTE | NASA | 1995 | Explorer |
| Fermi-GBM | NASA/DOE | 2008 | Strategic Observatory |
| XMM-Newton | ESA | 1999 | |
| Suzaku | JAXA | 2005 | (SMEX) |
| NuSTAR | NASA | 2011 | SMEX |
| NeXT | JAXA | 2013 | NASA-MoO |
| JANUS | NASA | 2012/2115 | SMEX/Phase A |
| GEMS | NASA | 2012/2015 | SMEX/Phase A |
| IXO | ESA/NASA/JAXA | ~2020/TBD | Beyond Einstein Observatory |
| BHFP | NASA | TBD | Beyond Einstein Probe |
| EXIST/BHFP | NASA | TBD | Beyond Einstein Probe |
| Gen-X | NASA | >horizon | Astroph/ASMCS |
| Other opportunities | NASA | ? | SMEX, MIDEX, MoO |

# Strategic Mission Concept Study Awards

**James Adams** - Orbiting Astrophysical Spectrometer in Space (OASIS)

**Roger Brissenden** - A Concept Study of the Technology Required for Generation X: a Large Area and High Angular Resolution X-ray Observatory to Study the Early Universe

**Webster Cash** - New Worlds Observer: Direct Studies of Exoplanets

**Mark Clampin** - Extrasolar Planetary Imaging Coronagraph (EPIC)

**Jonathan Grindlay** - A Concept Study for the Energetic X-ray Imaging Survey Telescope (EXIST) and OIR Telescope Mission to Study Black Holes on all Scales and GRBs as Cosmic Probes

**Olivier Guyon** - Pupil-mapping Exoplanet Coronagraphic Observer (PECO)

**Jacqueline Hewitt** - A Lunar Array for Radio Cosmology: Reionization, the Dark Ages, and More

**Joseph Lazio** - Concept Study for the Dark Ages Lunar Interferometer (DALI)

**Geoffrey Marcy** - Planet Hunter Mission Concept Study

**Gary Melnick** - Continued Study of the Cosmic Inflation Probe Mission Concept

**Stephan Meyer** - A Study for a CMB Probe of Inflation

**Thomas Murphy** - Testing Fundamental Gravity via Laser Ranging to Mars

**Marc Postman** - Advanced Technology Large Aperture Space Telescope: A Technology Roadmap for the Next Decade

**Scott Sandford** - The Astrobiology SPace InfraRed Explorer (ASPIRE) Mission: A Concept Mission to Understand the Role Cosmic Organics Play in the Origin of Life.

**Paul Scowen** - Instrument to Study Star Formation Near and Far

**Kenneth Sembach** - A Concept Study and Technology Roadmap for Future Spectroscopic Studies of the Intergalactic Medium

**Michael Shao** - Dilute Aperture Visible Nulling Coronagraph Imager (DAViNCI)

**David Spergel** - Extrasolar Planet Characterizer (XPC)

**John Trauger** - ACCESS - A science and engineering assessment of space coronagraph concepts for the direct imaging and spectroscopy of exoplanetary systems

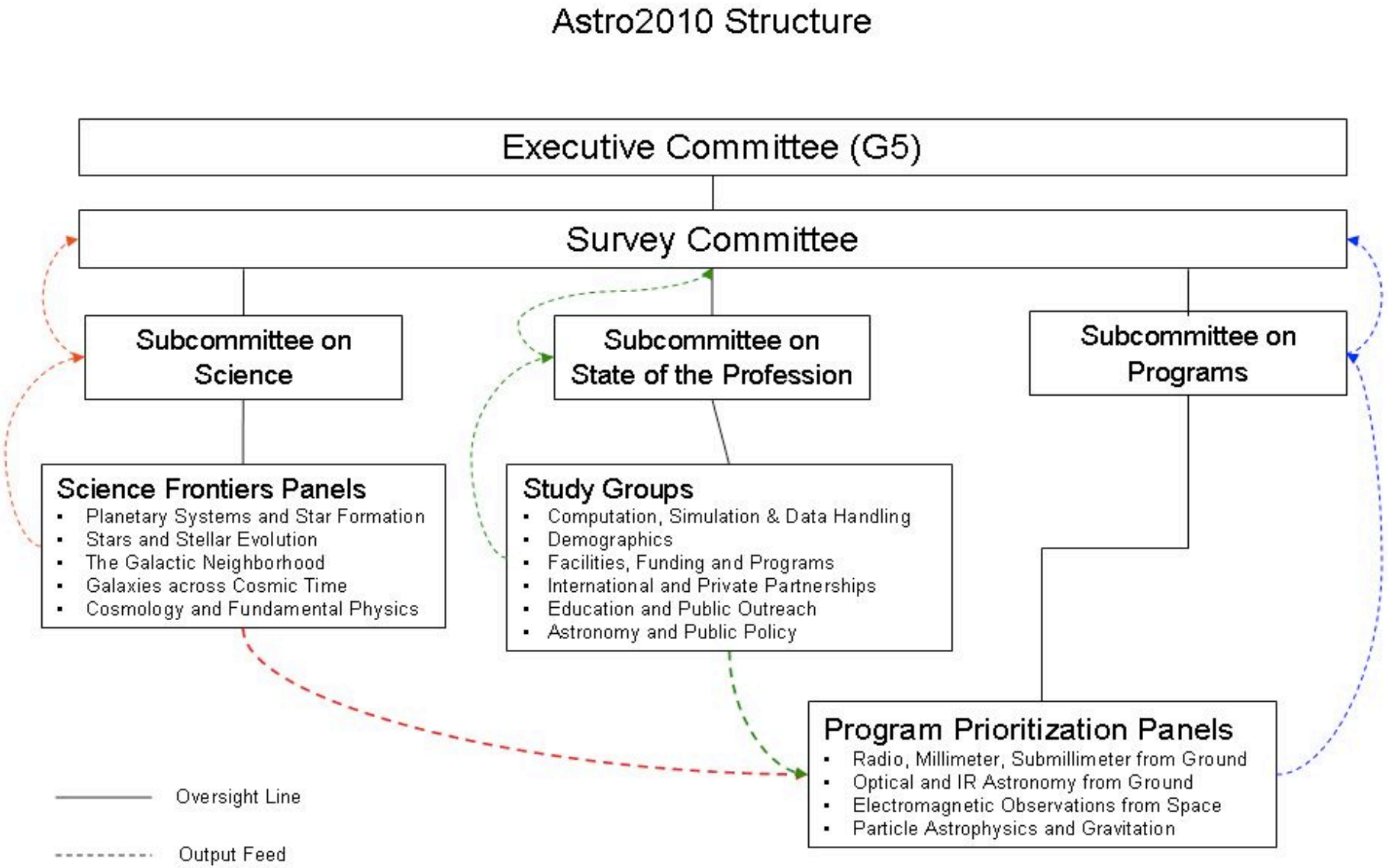
# JDEM Update

- Ongoing discussions with ESA on a possible dark energy satellite collaboration.
- Would ensure that JDEM remains in the medium-class cost box for the U.S. (NASA + DOE) contribution.
- Last meeting of the JDEM Science Coordination Group occurs next week:
  - Final definition of science requirements.
  - Final SCG discussions with GSFC JDEM Project Office on its Reference Mission design.
- Reference Mission (specified in AO) may change following Phase A trade studies, possible collaboration with ESA.
- Figure-of-Merit Science Working Group report and software now on web, jdem.gsfc.nasa.gov.

# IXO Update

- NASA/ESA and NASA/JAXA Letters of Agreement on IXO remain to be signed.  Must ensure that technical exchanges during joint concept study do not violate ITAR restrictions.

# Astro2010 Survey



# Astro2010 Survey Committee

**Roger Blandford,** Chair, Stanford University
**Lynne Hillenbrand**, Executive Officer, California Institute of Technology

## Subcommittee on Science

**Martha P. Haynes**, Vice Chair – Science Frontiers, Cornell University
**Lars Bildsten**, University of California, Santa Barbara
**John E. Carlstrom**, The University of Chicago
**Fiona A. Harrison**, California Institute of Technology
**Timothy M. Heckman**, Johns Hopkins University
**Jonathan I. Lunine**, University of Arizona
**Juri Toomre**, University of Colorado at Boulder
**Scott D. Tremaine**, Institute for Advanced Study

## Subcommittee on State of the Profession

**John P. Huchra**, Vice Chair – State of the Profession, Harvard-University
**Debra M. Elmegreen**, Vassar College
**Joshua Frieman**, Fermi National Accelerator Laboratory
**Robert C. Kennicutt**, Jr., University of Cambridge
**Dan McCammon**, University of Wisconsin-Madison
**Neil de Grasse Tyson**, American Museum of Natural History

→ **Infrastructure Study Groups**

## Subcommittee on Programs

**Marcia J. Rieke**, Vice Chair – Program Prioritization, University of Arizona
**Steven J. Battel**, Battel Engineering
**Claire E. Max**, University of California, Santa Cruz
**Steven M. Ritz**, NASA Goddard Space Flight Center
**Michael S. Turner**, The University of Chicago
**Paul Adrian Vanden Bout**, National Radio Astronomy Observatory
**A. Thomas Young**, Lockheed Martin Corporation [Retired]

## Science Frontier Panels

Planetary Systems and Star Formation (Lee Hartmann)

Stars and Stellar Evolution (Roger Chevalier)

The Galactic Neighborhood (Mike Shull)

Galaxies across Cosmic Time (Meg Urry)

Cosmology and Fundamental Physics (David Spergel)

## Program Prioritization Panels

Radio, Millimeter and Submillimeter from the Ground

Optical and Infrared Astronomy from the Ground

Electromagnetic Observations from Space

Particle Astrophysics and Gravitation

# Decadal Update

- Program Prioritization Subcommittee received 172 Notices of Intent!
- Science White Papers, due Feb. 15: help Science Frontiers Panels develop program organized around key questions where future discoveries are expected.
- Subcommittee on Programs:
  - Oversees Program Prioritization Panels
  - Will issue in late February a Request for Information on all activities that will be considered in the program prioritization process. These are due April 1.
  - More detailed presentations will be requested in a second round of submissions from selected activities.
  - These will then meet with Program Panels in June, 2009.
  - Those considered in the second round will have cost and risk evaluated.
  - The Panels give Survey Committee a preliminary report of recommended programs and rankings by the Fall of 2009. Final Panel reports are published in addition to Survey Committee's report in 2010.
- The Particle Astrophysics and Gravitation Panel will include fundamental gravitational physics in its prioritization (clarification to AAS presentation).
- Community-initiated local Town Hall meetings are encouraged, to which Committee members should be invited.


# Backup

# PCOS Mission Assignments at HQ

| | Mission | Program Scientist | Program Executive |
|---|---|---|---|
| PCOS Missions | PCOS Program | Michael Salamon | Ray Taylor |
| | Chandra | Wilt Sanders | Jaya Bajpayee |
| | IXO | Wilt Sanders | Ray Taylor |
| | Fermi | Ilana Harrus | Dan Blackwood |
| | Integral | Wilt Sanders | Wilt Sanders |
| | JDEM | Richard Griffiths | Ray Taylor |
| | LISA | Michael Salamon | Anne-Marie Novo-Gradac |
| | Planck | Michael Salamon | Michael Salamon |
| | Suzaku | Lou Kaluzienski | Lou Kaluzienski |
| | XMM-Newton | Lou Kaluzienski | Lou Kaluzienski |
| | Balloons | Vernon Jones | Mark Sistelli |
| X-ray Explorers | Swift | Ilana Harrus | Ilana Harrus |
| | RXTE | Ilana Harrus | Ilana Harrus |
| | NuSTAR | Lou Kaluzienski | Mark Sistilli |
| | Astro-H | Lou Kaluzienski | Anne-Marie Novo-Gradac |

# NASA and SMD President's Budget Request FY09-FY13

| | * FY2007 | * FY2008 | FY2009 | FY2010 | FY2011 | FY2012 | FY2013 |
|---|---|---|---|---|---|---|---|
| Total NASA | $16,231.0 | $17,300.5 | $17,610.7 | $18,022.9 | $18,457.0 | $18,901.6 | $19,355.4 |
| Science | $4,609.9 | $4,706.2 | $4,441.5 | $4,482.0 | $4,534.9 | $4,643.4 | $4,761.6 |
| Earth Science | $1,198.5 | $1,280.3 | $1,367.5 | $1,350.7 | $1,250.9 | $1,264.4 | $1,290.3 |
| Planetary Science | $1,215.6 | $1,247.5 | $1,334.2 | $1,410.1 | $1,537.5 | $1,570.0 | $1,608.7 |
| Astrophysics | $1,365.0 | $1,337.5 | $1,164.5 | $1,122.4 | $1,057.1 | $1,067.7 | $1,116.0 |
| Heliophysics | $583.7 | $590.9 | $575.3 | $598.9 | $689.4 | $741.2 | $746.6 |
| DSN/Ground Network | $247.2 | $250.0 | | | | | |
| Aeronautics Research | $593.8 | $511.7 | $446.5 | $447.5 | $452.4 | $456.7 | $467.7 |
| Education | $114.1 | $137.9 | $112.1 | $122.7 | $120.4 | $120.4 | $120.4 |
| Exploration Systems | $2,837.6 | $3,143.0 | $3,500.5 | $3,737.7 | $7,048.2 | $7,116.8 | $7,666.8 |
| Constellation Systems | $2,114.7 | $2,471.9 | $3,048.2 | $3,252.8 | $6,479.5 | $6,521.3 | $7,080.5 |
| Advanced Capabilities | $722.9 | $671.1 | $452.3 | $484.9 | $568.7 | $595.5 | $586.3 |
| Space Operations | $5,093.5 | $5,526.2 | $5,774.7 | $5,872.7 | $2,900.1 | $3,089.9 | $2,788.5 |
| Space Shuttle | $3,295.3 | $3,266.7 | $2,981.7 | $2,983.6 | $95.7 | | |
| International Space Station | $1,469.0 | $1,813.2 | $2,060.2 | $2,277.0 | $2,176.4 | $2,448.2 | $2,143.1 |
| Space and Flight Support (SFS) | $329.2 | $446.3 | $732.8 | $612.1 | $628.0 | $641.7 | $645.4 |
| Cross-Agency Support | $2,949.9 | $3,242.9 | $3,299.9 | $3,323.9 | $3,363.7 | $3,436.1 | $3,511.2 |
| Agency Management and Operations | $971.2 | $830.2 | $945.6 | $945.5 | $939.8 | $950.5 | $961.3 |
| Institutional Investments | $223.8 | $319.7 | $308.7 | $331.7 | $335.9 | $330.4 | $338.3 |
| Congressionally Directed Items | | $80.0 | | | | | |
| Center Management and Operations | $1,754.9 | $2,013.0 | $2,045.6 | $2,046.7 | $2,088.0 | $2,155.2 | $2,211.6 |
| Inspector General | $32.2 | $32.6 | $35.5 | $36.4 | $37.3 | $38.3 | $39.2 |

* FY07-08 are consistent with IBPD, and exclude latest Operating Plans. Subsequent charts INCLUDE Operating Plans.

# Astrophysics Program Content (FY09 Pres. Budget)

| | * FY07 | * FY08 | FY09 | FY10 | FY11 | FY12 | FY13 |
|---|---|---|---|---|---|---|---|
| FY09 President's Budget * | 1,356.8 | 1,363.5 | 1,162.5 | 1,122.4 | 1,057.1 | 1,067.7 | 1,116.0 |
| Physics of the Cosmos | 196.5 | 157.2 | 157.0 | 219.8 | 249.0 | 271.1 | 326.0 |
| GLAST | 84.4 | 41.9 | 23.2 | 23.3 | 24.1 | 24.9 | 24.9 |
| JDEM | | 3.7 | 8.5 | 63.0 | 83.0 | 109.0 | 125.0 |
| LISA | 6.5 | 5.7 | 5.7 | 15.9 | 18.7 | 26.7 | 35.0 |
| Constellation-X | 8.3 | 8.1 | 8.3 | 12.0 | 16.8 | 15.9 | 42.0 |
| Chandra | 58.6 | 62.9 | 65.0 | 67.8 | 68.5 | 50.2 | 48.9 |
| XMM | 8.6 | 7.4 | 7.0 | 7.4 | 7.6 | 8.5 | 8.5 |
| Herschel/Planck & Other | 48.4 | 27.6 | 76.1 | 56.6 | 54.5 | 59.9 | 64.7 |
| Exoplanet Exploration | 184.6 | 159.5 | 48.1 | 67.7 | 68.4 | 96.4 | 126.2 |
| SIM | 30.4 | 24.3 | | | | | |
| Kepler | 121.8 | 79.5 | 25.2 | 14.9 | 13.9 | 12.6 | 8.8 |
| Keck Operations | 2.8 | 2.8 | 2.9 | 3.0 | 3.1 | 3.2 | |
| TPF/EXEP Tech | 8.0 | 7.5 | 6.7 | 6.3 | 6.4 | 7.5 | 8.7 |
| Future Exoplanet Missions | 1.0 | 23.8 | 6.6 | 41.7 | 44.0 | 72.0 | 107.5 |
| Other | 20.6 | 21.6 | 6.7 | 1.8 | 1.0 | 1.0 | 1.2 |
| Cosmic Origins | 788.9 | 816.9 | 674.4 | 571.1 | 515.4 | 485.6 | 458.5 |
| James Webb Space Telescope | 398.6 | 447.4 | 371.9 | 311.1 | 265.1 | 236.1 | 194.9 |
| Hubble Space Telescope | 277.5 | 230.2 | 154.9 | 125.6 | 114.7 | 94.8 | 93.9 |
| SOFIA | 38.9 | 64.0 | 72.8 | 72.8 | 57.0 | 58.8 | 60.6 |
| Spitzer | 73.8 | 75.4 | 71.7 | 15.9 | 10.3 | 3.2 | 3.3 |
| Astrophysics Future Missions | | | 3.0 | 45.8 | 68.3 | 92.7 | 105.8 |
| Astrophysics Explorer | 88.0 | 117.2 | 130.6 | 93.3 | 43.3 | 11.7 | 6.4 |
| WISE | 52.9 | 72.7 | 65.2 | 13.0 | 5.2 | 1.6 | |
| NuSTAR | | 16.7 | 41.5 | 57.8 | 31.0 | 6.8 | 6.4 |
| Operating Explorers (Swift, Suzaku, RXTE, GALEX, WMAP) | 35.1 | 27.8 | 23.9 | 22.5 | 7.1 | 3.2 | |
| Astrophysics Research | 98.8 | 112.6 | 152.3 | 170.4 | 181.0 | 203.0 | 198.9 |
| Research and Analysis | 52.2 | 56.6 | 61.4 | 65.4 | 69.3 | 72.6 | 77.5 |
| Balloons | 22.2 | 24.0 | 24.6 | 26.7 | 28.8 | 32.4 | 33.2 |
| ADCAR | 9.0 | 12.6 | 12.8 | 13.4 | 17.7 | 33.5 | 24.3 |
| Other | 24.5 | 19.4 | 53.5 | 65.1 | 65.2 | 64.4 | 63.8 |

*** FY07 and FY08 reflect latest proposed Operating Plan, in FY09 structure**