



Astrophysics Division Update

NASA Advisory Council Astrophysics Subcommittee

Dr. Jon Morse
Astrophysics Division Director
Science Mission Directorate
NASA Headquarters

January 28, 2008



Astrophysics Division – Current Assignments

Director
Jon Morse
Deputy Director
Rick Howard

Resource Management
Renee Leck +
David Darbouze +
Omana Cawthon +

Kelly Johnson, *Lead Secretary*
Lydia Thompson, *Secretary*
Sheila Gorham, *Program Support Specialist*
Mary Orebeaux, *Program Support Assistant*

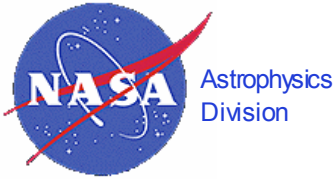
Division Technologist: Dan Blackwood
Division PAO POC: Doug Hudgins *
Division E/PO POC: Hashima Hasan
Information Manager: Lisa Wainio *

Research and Data Analysis
Division R&A POC: Wilt Sanders

| | |
|-------------------------|--|
| Astrobiology: | Doug Hudgins * |
| Cosmic Ray: | Vernon Jones |
| Gamma Ray/X-ray: | Lou Kaluzienski Rick Harnden * Wilt Sanders * |
| BEFS/Theory: | Michael Salamon Ron Hellings * |
| IR/Submillimeter/Radio: | Wilt Sanders * Eric Smith Doug Hudgins * |
| Optical/Ultraviolet: | Hashima Hasan Zlatan Tsvetanov * Stephen Ridgway * |
| MO&DA: | Pam Marcum * Jeffrey Hayes * Alan Smale |

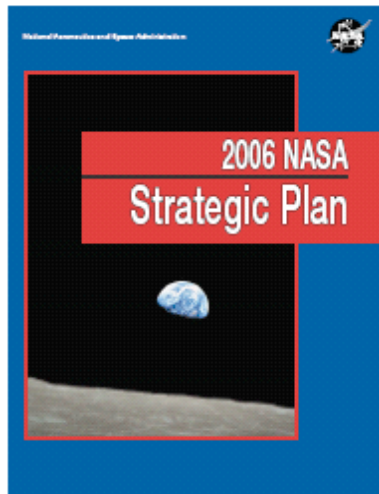
| Missions | | |
|-----------------|--------------------------|--------------------------|
| | <u>Program Scientist</u> | <u>Program Executive</u> |
| AMS | Vernon Jones | Mark Sistilli |
| Balloons | Vernon Jones | Mark Sistilli |
| Chandra | Wilt Sanders * | Alan Smale |
| Con-X | Wilt Sanders * | Ray Taylor |
| GALEX | Zlatan Tsvetanov * | Alan Smale |
| GLAST | Rick Harnden* | Dan Blackwood |
| GP-B | Michael Salamon | Alan Smale |
| Herschel | Doug Hudgins * | Doug Hudgins * |
| HST | Jeff Hayes * | Dev:Moore Ops:Hayes |
| Integral | Rick Harnden * | Alan Smale |
| JDEM | Ron Hellings * | Raynor Taylor |
| JWST | Eric Smith | Dan Blackwood |
| Keck Int. | Stephen Ridgway * | Stephen Ridgway * |
| Kepler | Pam Marcum * | Lia LaPiana |
| LBTI | Stephen Ridgway * | Michael Moore |
| LISA | Michael Salamon | Anne-Marie Novo-Gradac |
| MSC | Stephen Ridgway * | Lia LaPiana |
| NuSTAR | Lou Kaluzienski | Mark Sistilli |
| Planck | Michael Salamon | Michael Salamon |
| RXTE | Alan Smale | Alan Smale |
| SIM | Stephen Ridgway* | Lia LaPiana |
| Spitzer | Doug Hudgins * | Jeffrey Hayes * |
| SOFIA | Paul Hertz # | Raynor Taylor |
| Suzaku | Wilt Sanders * | Alan Smale |
| Swift | Rick Harnden* | Alan Smale |
| TPF | Zlatan Tsvetanov * | Lia LaPiana |
| WISE | Pam Marcum * | Anne-Marie Novo-Gradac |
| WMAP | Michael Salamon | Alan Smale |
| XMM-Newton | Wilt Sanders * | Alan Smale |

+ Members of the Mgmt & Policy Division
Member of SMD Front Office
* Detailee, IPA, or contractor



Astrophysics Re -organization

- Re-establish intellectual foundation for Astrophysics theme
 - The Problem: Astrophysics currently has 4 missions in development that are one-project programs (plus Kepler from Discovery program in another division) and looks much different than all the other SMD Divisions
 - The Solution: Science -based programs that contain multiple, coupled projects
 - HQ Program Directors report to Division Director
 - Program Scientist is assigned to each program
 - Program Manager manages each program at a field center



NASA Strategic Plan
February 2006

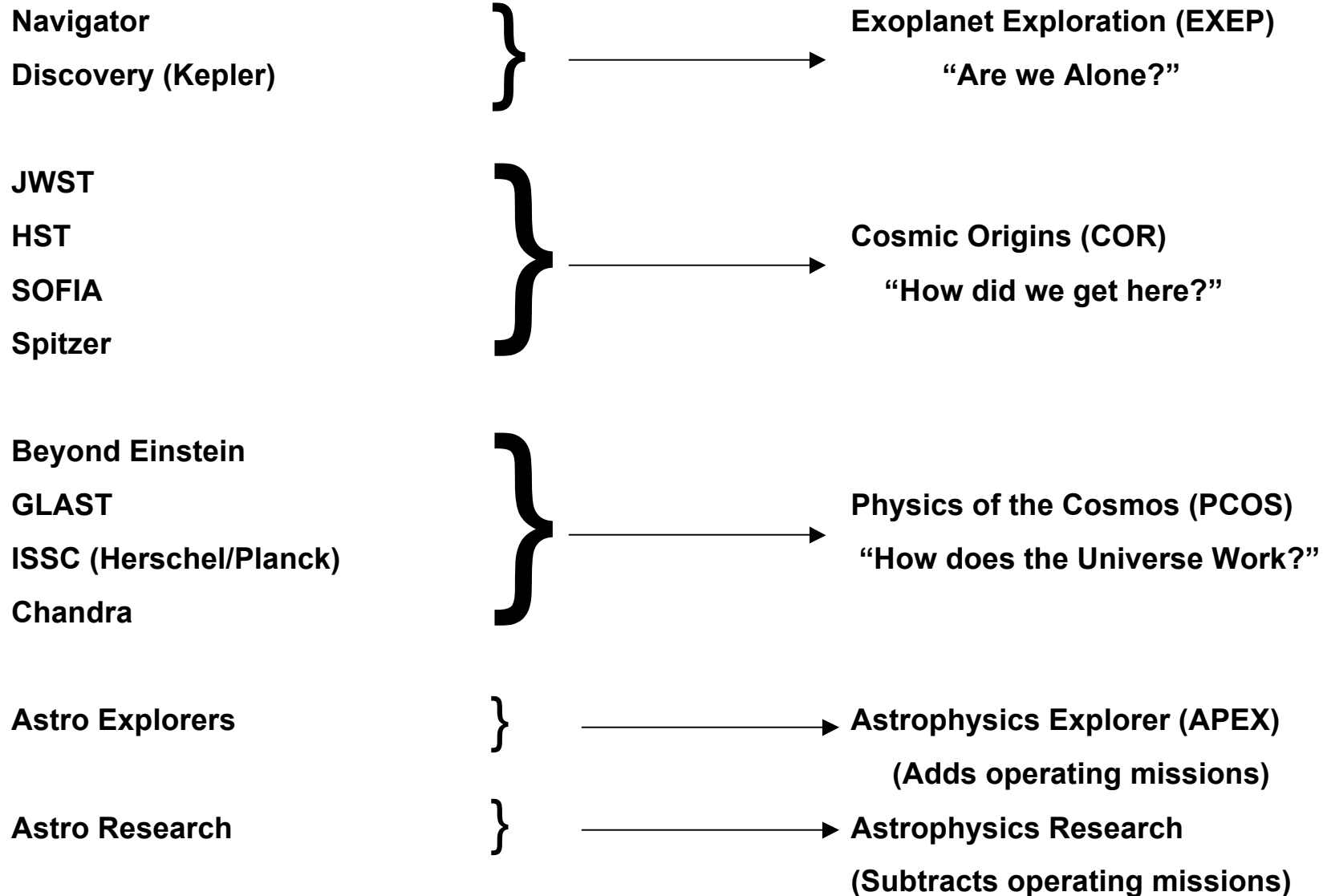
- Science-based grouping of missions is especially useful for forward planning
 - Intellectual framework helps to justify new initiatives and maintain a scientifically balanced portfolio
 - Upcoming strategic planning and NRC Decadal Survey
- Proposed scientific programs: Cosmic Origins, Physics of the Cosmos, Exoplanet Exploration
 - Plus Astrophysics Explorers and Astrophysics Research programs which already exist



Astrophysics – Potential Re-organization

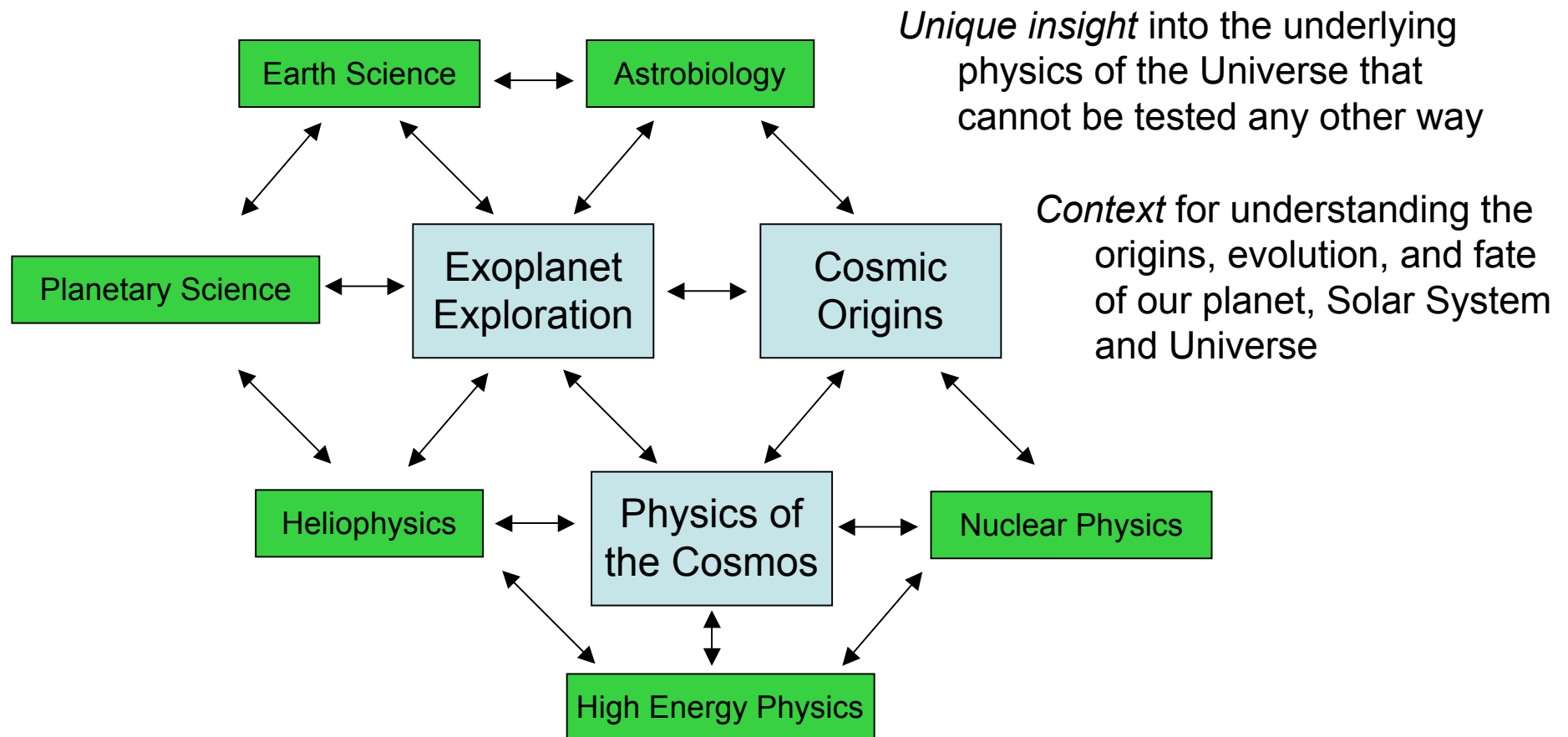
Current Program Structure

New Program Structure



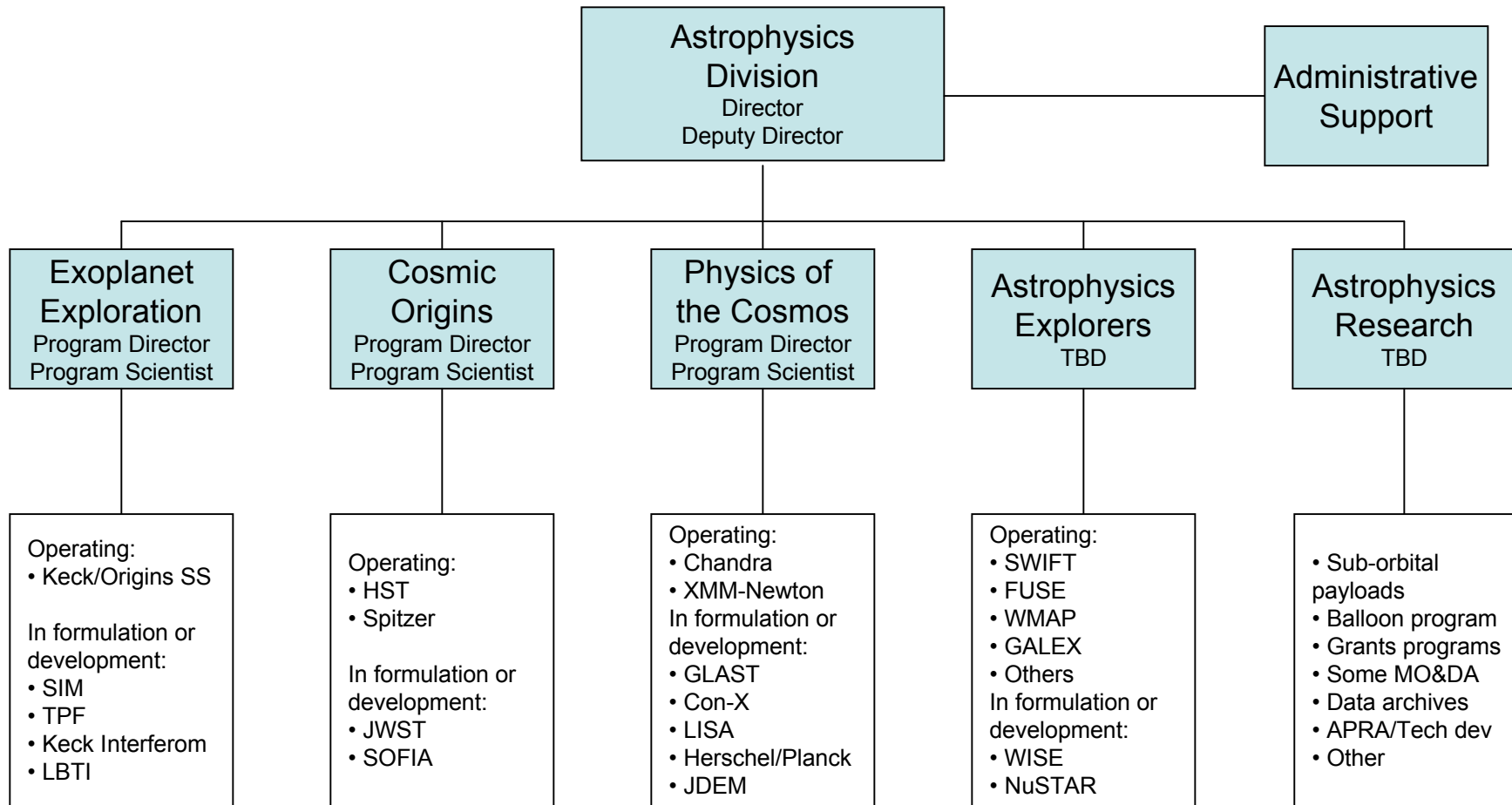
Astrophysics and Related Fields

Observing the cosmos complements, augments
and bridges other disciplines by providing:





Astrophysics – Potential Re-organization



Program organization aids:

1. Forward planning – science, technology & programmatic balance
2. Cost reserve management



Astrophysics Division: Project News

- Re-instatement of **NuSTAR** mission for launch in 2011 (PI: Fiona Harrison, Caltech)
- Small Explorer (**SMEX**) Announcement of Opportunity
 - Includes Missions of Opportunity, Solar Orbiter, and ISS payloads
- Exciting new capabilities planned for launch this year and next:
 - 2008: GLAST, HST-SM4, Herschel, Planck**
 - 2009: Kepler, WISE**
 - PLUS: EPOXI** exoplanet Mission of Opportunity investigation with Deep Impact S/C in 2008 (EPOCH PI: Drake Deming, GSFC) [PSD funded]
- Early science in 2009 with **SOFIA**
- Possible future AO solicitations for PI-led science investigations on medium-class strategic missions
 - 2008 **dark energy mission**, 2009 **exoplanets probe**
- James Webb Space Telescope (JWST), the current Astrophysics flagship, will hold its PDR/NAR to enter development in Spring 2008

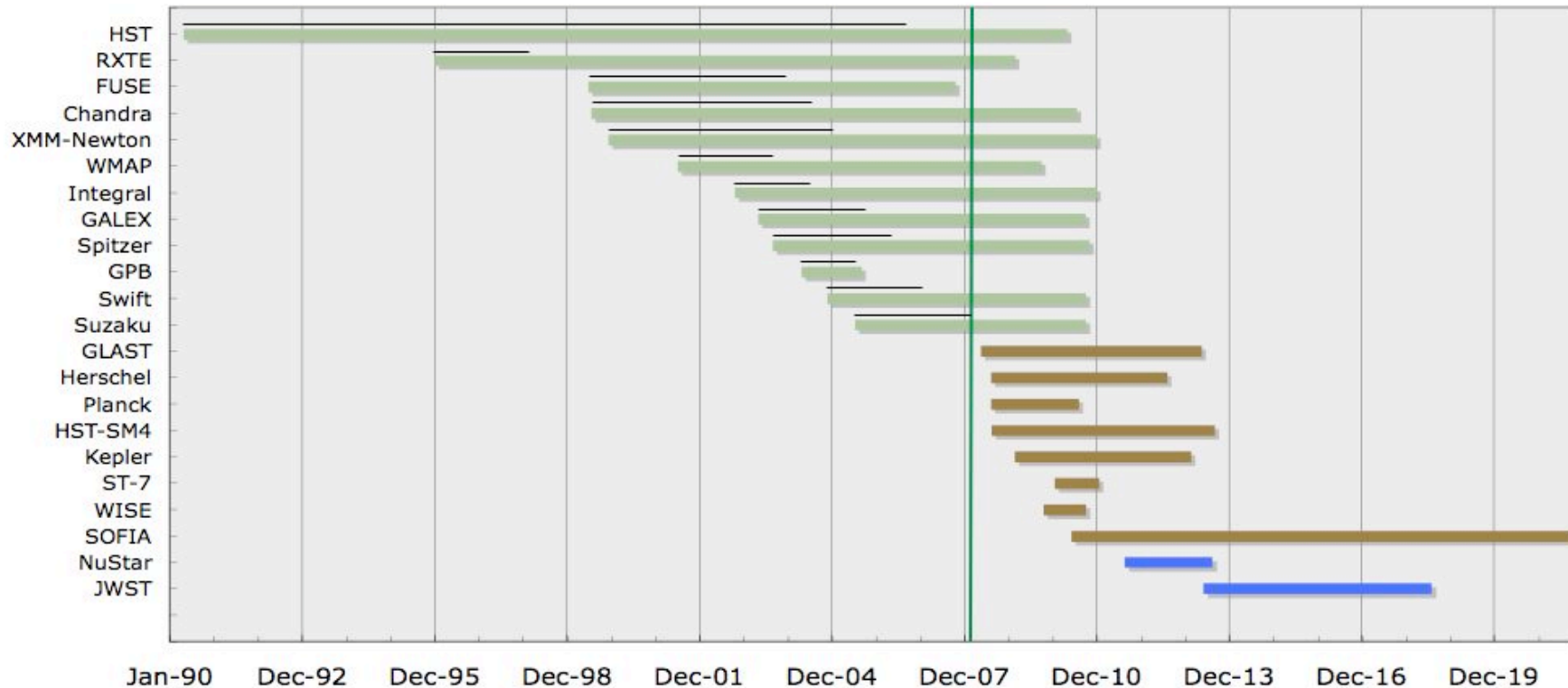


Astrophysics Mission Events

| | CY 2007 | 2008 | 2009 | 2010 | 2011 |
|---|--|--|--|----------------------|------|
| Mission Launches etc. | | NET May 16 GLAST NET Aug 7 HST SM4 Oct 31 Herschel Planck EPOCH Obs (Jan-May) | NET Feb 16 Kepler Aug SOFIA Early Sci Nov WISE | | |
| Suborbital <i>Rocket Program.</i> | Aug LIDOS #1 | Jan LIDOS #2 Jan XQC #3 Mar PICT-URE #1 May CIBER #1 Nov FUSP #1 | May HRF #1 May CIBER #2 Oct FUSP #2 | TBD HRF #2 | |
| Balloon Campaigns | | | | | |
| Antarctica | D/J (ANITA, BLAST) | D/J (CREAM, BESS, ATIC) | D/J | D/J | D/J |
| Sweden | J/F (FIRS2/SLS +) | | | M/J | |
| Ft. Sumner (spr) | M/J (HERO, TIGRE) | A/M | A/M | A/M | A/M |
| Palestine | J/J (FIREBALL, GRAPE, LEE ^) | J/J | J/J | J/J | J/J |
| Ft. Sumner (fall) | A/S (SUNRISE ^, SBI ^, HASP *, MKIV +) | | A/S | A/S | A/S |
| Australia | | | S/O | | S/O |
| Opportunities | Aug Mission Concept NRA Sep SMEX AO | Spring Mission S.R. May/June Archive S.R. | | | |

Legend
 Purple - Mission with international lead
 + Earth Science Division balloon flight
 ^ Heliophysics Division balloon flight
 * Other Student Opportunity balloon flight

Astrophysics Timelines



— Denotes prime mission lifetime at launch

Mission Phase: Green (operations), Brown (development), Blue (formulation)



Astrophysics Division: Project News

Senior Review of Operating Missions

- Call for proposals released January 22, 2008
- Proposals due March 12, 2008
- Review in April 22-25, 2008

NASA HQ will instruct the Senior Review panel to:

- (1) In the context of the science goals, objectives, and research focus areas described in the Science Mission Directorate's Science and Strategic Plans, rank the scientific merit on a "science per dollar" basis – based upon the expected returns from the projects reviewed during 2009 and 2010.
- (2) Assess the cost efficiency, technology development and dissemination, data collection, archiving and distribution, and education/outreach as secondary evaluation criteria, after science merit/usefulness.
- (3) Assess the opportunity costs of the various missions under review, specifically by comparing the projected science returns of these missions with potential advances to be gained by increasing investments in core R&A programs (e.g., ADP, ATRP, APRA) and/or initiating a budget line for a frequent (approximately bi-annual) Astrophysics Mission of Opportunity call for proposals.**
- (4) Based on (1) through (3), provide findings to assist with an implementation strategy for Astrophysics Division support of operating missions for 2009 and 2010, including an appropriate mix of
 - continuation of projects as currently baselined;
 - continuation of projects with either enhancements or reductions to the current baseline;
 - mission extensions beyond the prime mission phase; and/or
 - project terminations
- (5)-(8): Make preliminary assessments equivalent to (1) through (4) for FY 2011 and 2012.



Astrophysics Division: Research News

- Strategic investments in **Research & Analysis** and Suborbital programs
 - Reinvigorate **suborbital programs** for science, technology, and on-ramps for PI/flight program leadership training
 - Increase flight rate for **sounding rockets**
 - Significant technical progress on **ULDB balloons**
 - Increase core R&A investments to achieve ~30% proposal success rates
 - **Restored** full funding for FY08 Astrophysics Theory grants
 - Strategic Mission Concept Studies NRA
 - 42 proposals submitted: 11 large missions, 31 medium missions
 - 8-10 selections anticipated, preparation for Decadal Survey
- Exoplanets Guest Observer research
 - **Kepler** GO program solicitation in 2008
 - Anticipate 2008 solicitation for a few GO investigations with Canadian MOST mission, coordinated with MOST PI and science team
- Senior Review of Archival Research program summer 2008



Astrophysics Fellowships

- NASA's named postdoctoral fellowships, like those at universities, are meant to be highly prestigious positions for cutting-edge, independent scholarship and vehicles to career growth for bright, young researchers
 - The last Decadal Survey commented that named fellowships are more enabling for career advancement than long-term research grants such as LTSA
- Postdoctoral fellowships offered through Astrophysics funding have proliferated in recent years
 - We now have Hubble, Chandra, Spitzer, Michelson, and GLAST fellowships, with others being contemplated
- Since resources are constrained and each fellowship opportunity is administered and reviewed separately:
 - Are we diluting the significance of named fellowship opportunities?
 - Are we using the available funding as efficiently as possible?
 - What criteria are used to determine whether a fellowship is warranted (e.g., any strategic mission)?



Astrophysics Fellowships

Astrophysics Division seeks advice from NAC-APS on the following proposal:

- Part I: Following the re-organization of Astrophysics into science-based themes, consolidate to three named postdoctoral fellowships, one for each theme:
 - Cosmic Origins (Hubble)
 - Physics of the Cosmos (Einstein)
 - Exoplanet Exploration (TBD)
- Fellowships will be administered and reviewed through each program
 - In the near-term, the total number of postdoctoral fellowships offered through Astrophysics funding will be retained or increased
 - Over the long-term, the fellowship opportunities will not depend on which missions come and go, but on the science opportunities that drive current and future missions
 - Streamline administration and review to maximize funding for the research
- Part II: Introduce Senior Fellowships in each program for mid-career and senior researchers
 - Funds highly talented members of the community at 100% for several years
 - Captures the essence of former LTSA opportunity by allowing integrated, multi-investigation research programs to be funded through a single proposal
 - Funding for 3 years, with possible extension for 2 additional years pending review



Administration and Use of NASA Keck Time

- Astrophysics supports NASA's 1/6 partner share in Keck Observatory
 - Keck partnership is administered through a cooperative agreement, costing ~\$3M/yr
 - NASA's share amounts to ~95 nights per year on Keck I and II
 - NASA has also invested in instrumentation, e.g., Keck Interferometer and upgrades to other instruments
- Keck time is competed through a proposal solicitation
- Science content has been limited primarily to exoplanets, formation of planetary systems, and solar system research

I. GUIDELINES FOR ALLOCATION OF NASA KECK TELESCOPE TIME

The NASA fraction of the Keck telescope time is to be used to support programs of interest to NASA for exploration of phenomena, within our solar system and in others, dealing primarily with the discovery and characterization of planetary systems and investigation of their origin and evolution. The allocated telescope time will be used for investigations within three science areas: detection of extrasolar planets, origin and nature of planetary systems, and investigation of our own solar system, in the order of priority. A small number of nights may also be assigned in some semesters for observations providing critical support of space missions. Within [these broad guidelines](#), the allocation of time will be made based on scientific merit, availability of resources, and technical appropriateness. ...



Administration and Use of NASA Keck Time

Astrophysics Division seeks advice from NAC-APS on the following proposal:

- Renew the cooperative agreement with Keck Observatory
- Open the Keck observing time to all science supported by Astrophysics
 - Four science categories: Cosmic Origins, Physics of the Cosmos, Exoplanet Exploration, Solar System Exploration
- Administer the solicitation, time allocation and awards from HQ
- Enter into an agreement with NSF/NOAO to make a fraction of NASA's Keck time available within the ground-based "System" beginning in semester 2009a
 - Allows NASA's Keck proposers options for integrated investigations with access to all facilities available to NOAO, especially in the southern hemisphere
 - Initial proposal is to allocate ~50% of NASA's Keck time to NOAO TAC process, with traceability in the proposal process to NASA science goals, and retain remaining time for other strategic use
 - Generates cost savings by leveraging NOAO TAC process

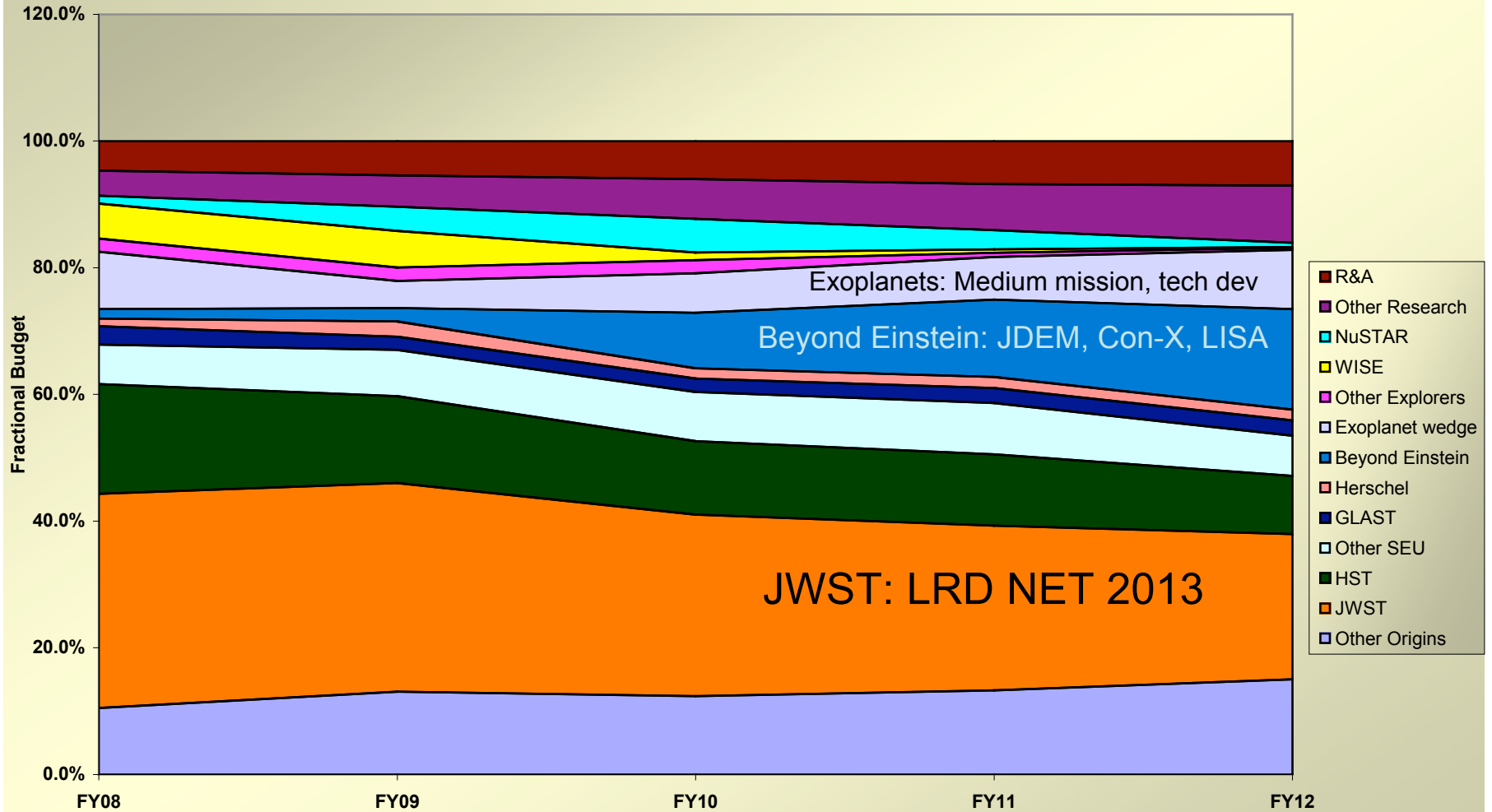


Astrophysics Division: Programmatic Balance

- Recent community reports call for re-establishing balance among small, medium, and large missions in the Astrophysics program:
 - Astronomy & Astrophysics Advisory Committee 2007 Annual Report:
“The balance between small, medium and large programs in the NASA Astrophysics Division has been undermined. The AAAC recommends that the funding “wedge” in FY09/10 be used to add some funding for R&A and small missions, to rebalance the program.”
 - NRC 2007 NASA Astrophysics Program Assessment report:
Recommendation #1: *“NASA should optimize the projected scientific return from its Astrophysics Program by ensuring a diversified portfolio of large and small missions that reflect the scientific priorities of the decadal review and by investing in the work required to bring science missions to their full potential: e.g., technology development, data analysis, data archiving, and theory.”*
- FY2008 Congressional appropriations directs NASA “to begin the development phase” of the Space Interferometry Mission (SIM)

Funding Profile of a Balanced Program

Notional Astrophysics Program (Balanced Portfolio)





Astro2010 Decadal Survey

- Commence community-based prioritization process in 2008 for producing a product in 2010
 - What are the new science opportunities in Astrophysics?
 - What major initiatives follow JWST?
 - What are future medium-class competed mission opportunities?
 - What is the proper balance between projects in development, operating missions, and R&A?
 - ...and many others issues.
- Work with the National Academies, partner agencies, advisory committees, community, and industry to improve the Decadal Survey process and output based on lessons learned