



# NASA's Astrophysics Division Missions in the Coming Decade

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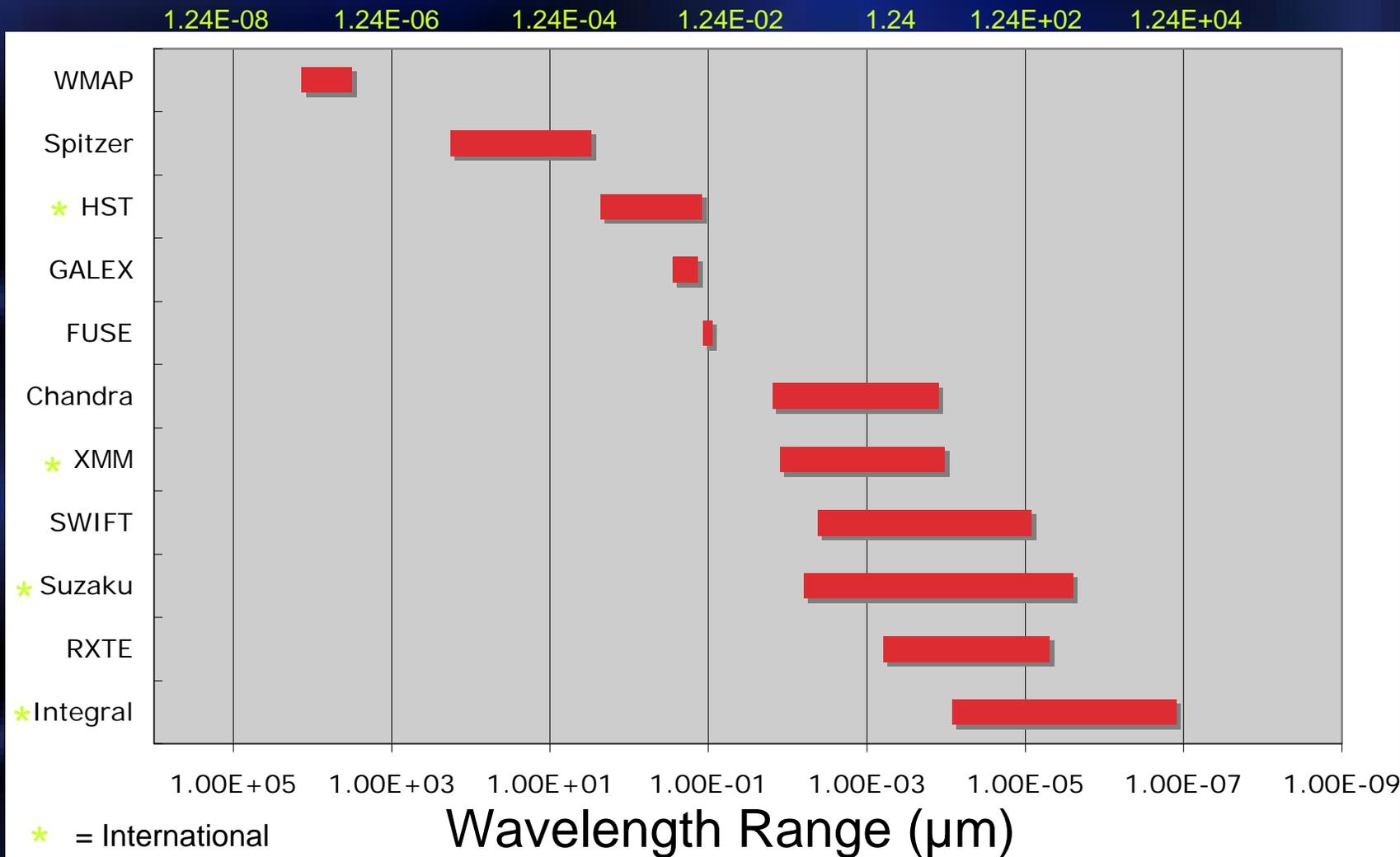
# Where Are We Today?

- 3 Great Observatories Operating
  - HST, *Chandra*, *Spitzer*
- 5 Explorer-class Missions Operating
  - FUSE, RXTE, WMAP, GALEX, SWIFT
- 4 International Missions Operating
  - HST, XMM, *Suzaku*, Integral
- Balloons (15-20 flights/year), Sounding Rockets (~1 flight/year for astrophysics)
- Broad Research and Analysis Program (Theory, submm - gamma ray)

# Wavelength Coverage



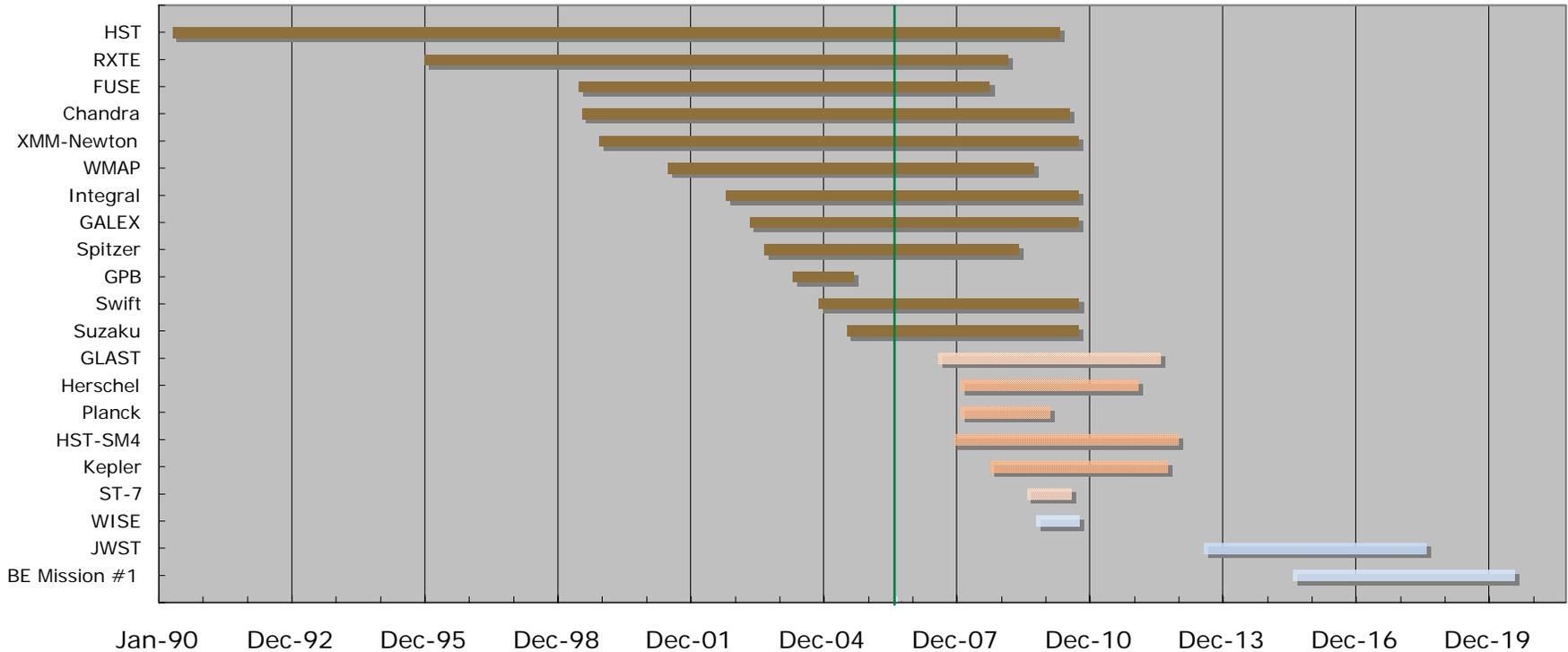
Energy Range (keV)



# Timelines



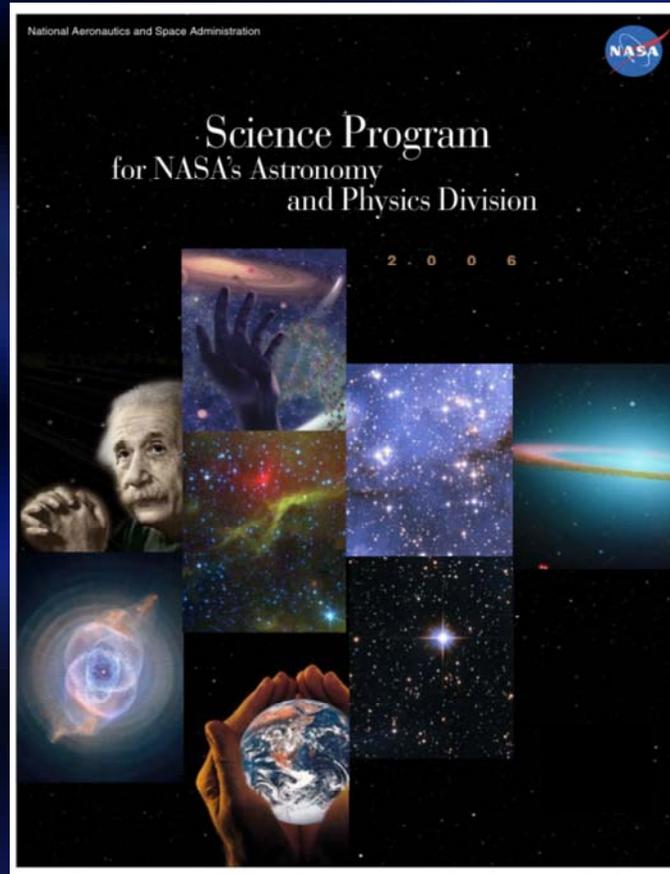
Operating and Planned Satellites



Orange: mission in development, blue: mission in formulation



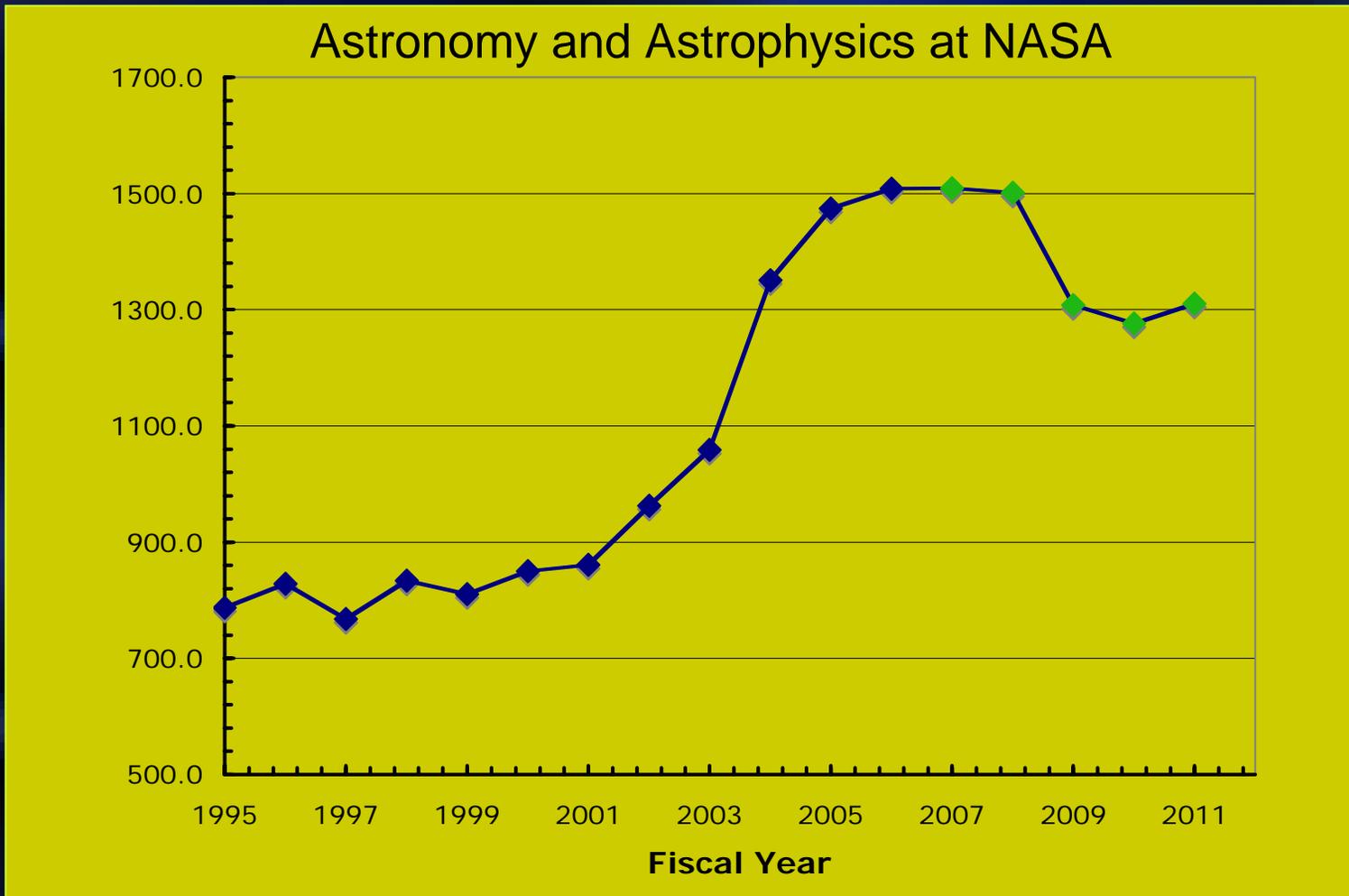
# Source Document for Astrophysics Division Planning



<http://science.hq.nasa.gov/strategy/comm.html>



# Funding “Filter”





# 2006-2016 Plan Elements

<u>Program</u>	<u>Launch</u>
• GLAST	2007
• HST Servicing Mission-4	2008
• <i>Herschel/Planck</i>	2008
• <i>Kepler</i>	2008
• WISE	2009
• SOFIA	2010
• JWST	2013
• Beyond Einstein Missions	TBD
• Terrestrial Planet Finder	TBD
• Competed Missions (Explorers, Discovery, Balloons, Rockets)	
• Technology Development	
• Research and Analysis	

# Astrophysics Missions



## Missions Identified in Most Recent NRC Decadal Surveys

In Plan?

*Astronomy & Astrophysics in the New Millennium (NRC, 2001)*

### Major Initiatives (space-based)

Next Generation Space Telescope (James Webb Space Telescope - JWST)	Y
Constellation-X Observatory	Y
Terrestrial Planet Finder (TPF)	tech development
Single Aperture Far Infrared (SAFIR) Observatory	N

### Moderate Initiatives (space-based)

Gamma-ray Large Area Space Telescope (GLAST)	Y
Laser Interferometer Space Antenna (LISA)	Y
Solar Dynamics Observatory (SDO)	Y (Helio)
Energetic X-ray Imaging Survey Telescope (EXIST)	Y^
Advanced Radio Interferometry between Space and Earth (ARISE)	N

### Reaffirms Missions from Previous Decadal Survey:

Stratospheric Observatory for Infrared Astronomy (SOFIA)	Y
Space Interferometry Mission (SIM)	tech development

Endorsed continuation of a vigorous Explorer program	Y*
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### *From Connecting Quarks to the Cosmos (NRC, 2003)*

“wide field telescope in space...to fully probe the nature of dark energy” – NASA/DOE implementation: Joint Dark Energy Mission (JDEM)	Y^
“measure the polarization of the cosmic microwave background” – NASA Implementation: Inflation Probe	Y^



# Portfolio Beyond 2016

- Planet Finding/Characterization missions
- Beyond Einstein Mission launches
- Other Competed (Explorer, Discovery) and Strategic Missions (from National Academy of Science decadal survey)
- Continued Technology Development
- Research and Analysis Program



# Astrophysics Division Developmental Missions Status



<i>Project</i>	<i>Launch</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>STATUS</i>
<b>Keck Intrfrmrtr</b>	N/A	Y	Y	Y	Technical effort focuses on nulling and support for highest priority science.
<b>Keck Outrigger</b>	N/A	R	R	R	Outriggers not funded in FY07- Looking at options.
<b>SOFIA</b>	TBD	R	R	R	No funds in President's FY07 budget and beyond. Agency PMC Sep 14, 2006, accepted program office plan. Agency PMC Nov 1 (baseline plan).
<b>LBTI</b>	Jun 2007 init. capability	G	G	G	Replan due to delays in telescope readiness complete.
<b>GLAST</b>	NET Nov 2007	Y	Y	Y	LAT checked out and ready for Obs integration. GBM/Obs integration continues. Budget reserves and launch date rebaseline DPMC held Oct 18.
<b>HST SM-4</b>	NET Jan 2008	G	G	G	Awaiting SM-4 decision and manifest date.
<b>Herschel</b>	Feb 2008	G	G	G	All hardware development has been completed.
<b>Planck</b>	Feb 2008	G	G	G	All hardware development has been completed.
<b>Kepler</b>	2008	Y	Y	Y	Continued technical issues. CDR accomplished.
<b>WISE</b>	2009	Y	Y	Y	WISE given new funding planning numbers for Oct 13 Delta Mission Confirmation Review. WISE has been confirmed. Phase C begins.
<b>JWST</b>	NET 2013	Y	Y	Y	Recent State Department policy change affecting TAAs w/ ESA threatens schedule.
<b>SIM</b>	NET 2015	G	G	G	Project is developing plan to latest FY07 planning #s.
<b>LISA</b>	TBD	G	G	G	Preparation underway for upcoming NRC review.
<b>Con-X</b>	TBD	G	G	G	Preparation underway for upcoming NRC review.
<b>TPF</b>	TBD	G	G	G	Plans for FY07 activities delivered to HQs and approved.
<b>Balloons</b>	on-going	Y	Y	Y	Multi-discipline Antarctica long-duration balloon campaign (astrophysics, helio-physics) planned to begin in December 2006. ULDB development funding issue.
<b>MSC</b>	N/A	G	G	G	Since the initial public release of the Palomar Testbed Interferometer data set another 400 sources have been added bringing total to 1100 sources.

# Astrophysics Division Operating Missions Status



Launch/EOM		Jul	Aug	Sep	STATUS
<b>HST</b> (Extended)	4-25-90 2010	G	Y	G	ACS Hi-Res Channel fully recovered functionality on 10/9.
<b>Rossi XTE</b> (Extended)	12-30-95 2-28-09	G	G	G	C-channel gyro stabilized by 10/6
<b>FUSE</b> (Extended)	6-24-99 9-30-08	G	G	G	Detector 2 shut off 10/1 by SEU. Returned to ops 10/4
<b>Chandra</b> (Extended)	7-19-99 7-19-10	G	G	G	Chandra Users Committee: 10/17
<b>XMM-Newton</b> (Extended)	12-9-99 9-30-10	G	G	G	
<b>WMAP</b> (Extended)	6-30-01 9-30-09	G	G	G	
<b>Integral</b> (Extended)	10-17-02 9-30-10	G	G	G	
<b>GALEX</b> (Extended)	4-28-03 9-30-10	G	G	G	NUV channel offline 10/2-4 due to understood overcurrent event.
<b>Spitzer</b> (Extended-Prime)	8-25-03 3-31-09	Y	G	G	
<b>GP-B</b> (DA mode)	4-20-04 8-30-05	G	G	G	
<b>Swift</b> (Prime)	11-20-04 9-30-10	G	G	G	Cycle 3 Peer Review; 10/2-10/3
<b>Suzaku</b> (Prime)	7-9-05 9-30-10	G	G	G	