Astrophysics Strategic Objectives and Goals

Presentation to the Astrophysics Subcommittee

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Context

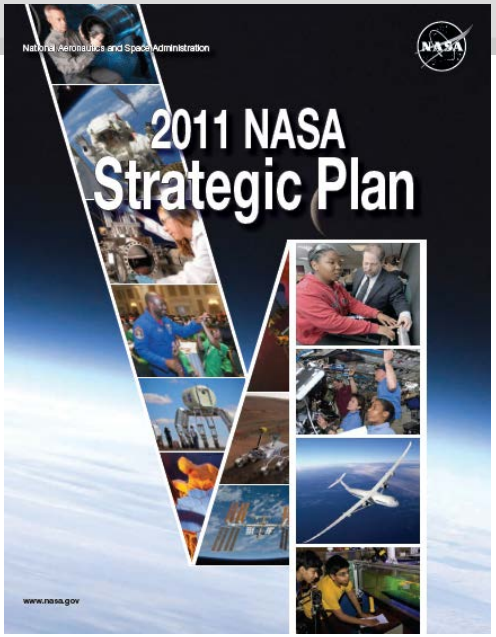
- **A new NASA Strategic Plan is being developed**

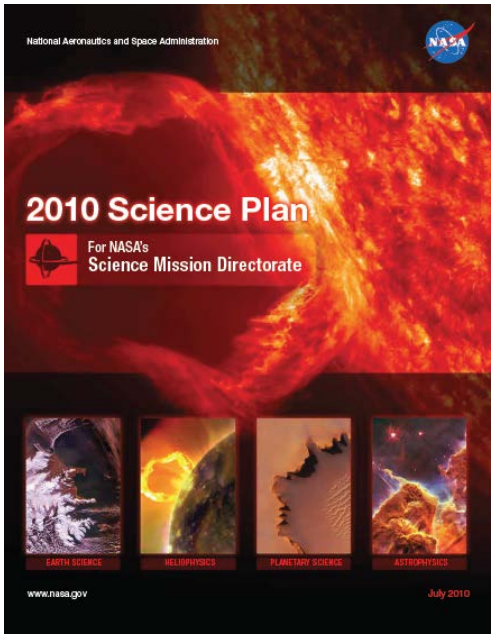
  http://www.nasa.gov/pdf/516579main_NASA2011StrategicPlan.pdf

- **A new SMD Science Plan is also being developed**

  http://science.nasa.gov/media/medialibrary/2010/08/10/2010SciencePlan.pdf

- **As part of this process, the Astrophysics Division has been asked to review and update, as needed, its objectives and goals**
- **These must reach broad constituencies**
- **In the new plans, there is a change in nomenclature:**
  - ***Outcomes*** will now be called ***Strategic Objectives***
  - ***Objectives*** will now be called ***Performance Goals***





Context

- **Important to keep in mind the primary audiences for the Astrophysics Objectives and Goals**
  - The main audience is *not* the science community!
  - Rather, the key audiences are:
    - OMB, OSTP, Congressional staffers
    - non-technical people at the top of the Agency
    - the general public

→***No jargon! Instead, user-friendly language that is exciting to non-scientists***

- **Also the objectives and goals have timescales over which we have to demonstrate progress to OMB**

Process

- **This is how we generated the draft objectives and goals**
  - **Start with discussions within the APD at HQ**
  - **Next, the PCOS, COR, and ExEP Program Scientists and Program Office Chief Scientists, and their deputies, met together by telecon**
  - **Chief Scientists then consulted with their respective PAG Executive Committees to provide suggested changes.**
  - **These inputs came back to HQ for discussion within the APD**

→ ***resulted in draft objective and goals***

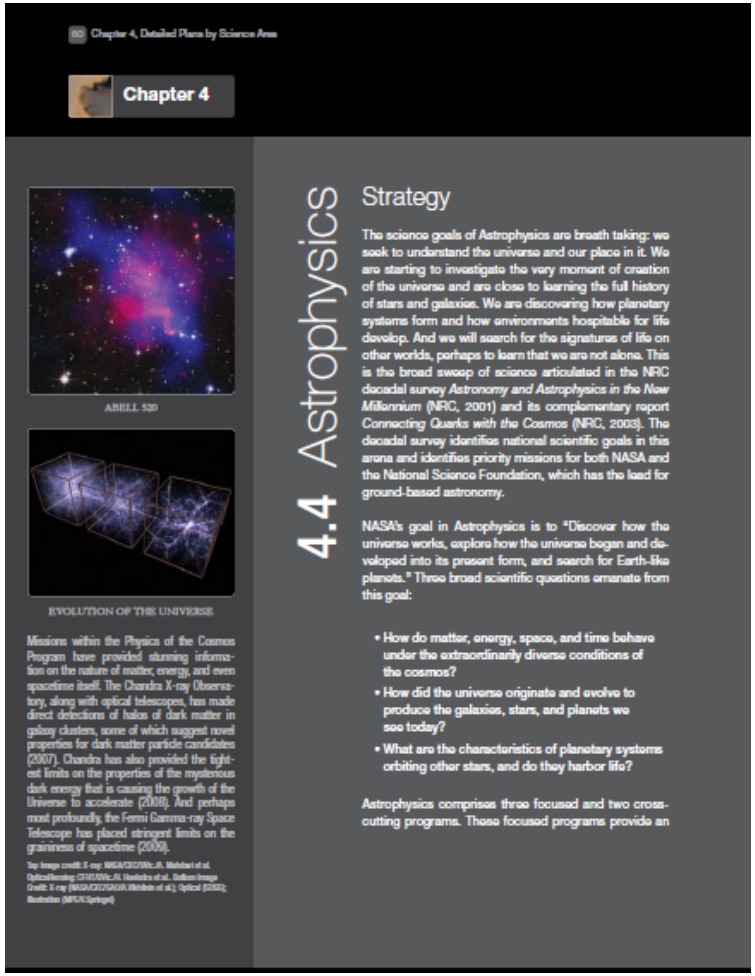
- **Now present to APS for comments**
- **APD must finalize by Feb 19 and submit to SMD planning group**

What is next….

- **The Astrophysics chapter of the Science Plan will be updated**

→ ***Provides opportunity to include more information on science and scope***

- **We will proceed in a similar manner:**
  - **Draft updates at HQ**
  - **Meet with Program Offices**
  - **Request inputs from PAGs**
- **Plan to ask the APS to review the revised chapter at April meeting**


Chapter 4, Detailed Plans by Science Area

Chapter 4

ABELL 520

EVOLUTION OF THE UNIVERSE

Missions within the Physics of the Cosmos Program have provided stunning information on the nature of matter, energy, and even spacetime itself. The Chandra X-ray Observatory, along with optical telescopes, has made direct detections of halos of dark matter in galaxy clusters, some of which suggest novel properties for dark matter particle candidates (2007). Chandra has also provided the tightest limits on the properties of the mysterious dark energy that is causing the growth of the Universe to accelerate (2008). And perhaps most profoundly, the Fermi Gamma-ray Space Telescope has placed stringent limits on the graininess of spacetime (2009).

4.4 Astrophysics

Strategy

The science goals of Astrophysics are breath taking: we seek to understand the universe and our place in it. We are starting to investigate the very moment of creation of the universe and are close to learning the full history of stars and galaxies. We are discovering how planetary systems form and how environments hospitable for life develop. And we will search for the signatures of life on other worlds, perhaps to learn that we are not alone. This is the broad sweep of science articulated in the NRC decadal survey *Astronomy and Astrophysics in the New Millennium* (NRC, 2001) and its complementary report *Connecting Quarks with the Cosmos* (NRC, 2003). The decadal survey identifies national scientific goals in this arena and identifies priority missions for both NASA and the National Science Foundation, which has the lead for ground-based astronomy.

NASA's goal in Astrophysics is to "Discover how the universe works, explore how the universe began and developed into its present form, and search for Earth-like planets." Three broad scientific questions emanate from this goal:

- How do matter, energy, space, and time behave under the extraordinarily diverse conditions of the cosmos?
- How did the universe originate and evolve to produce the galaxies, stars, and planets we see today?
- What are the characteristics of planetary systems orbiting other stars, and do they harbor life?

Astrophysics comprises three focused and two cross-cutting programs. These focused programs provide an

Astrophysics Strategic Objective and Performance Goals

Strategic Objective / Performance Goals	Current Wording (2011 NASA Strategic Plan)	Proposed Wording
Astrophysics (strategic objective; timescale is >5 years)	Discover how the universe works, explore how it and evolved, and search for Earth-like planets	Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars
Physics of the Cosmos (PCOS) (timescale is up to several yrs)	Understand the origin and destiny of the universe, and the nature of black holes, dark energy, dark matter and gravity	Probe the origin and destiny of the universe, and the nature of black holes, dark energy, dark matter and gravity
Cosmic Origins (COR) (timescale is up to several yrs)	Understand the many phenomena and processes associated with galaxy, stellar, and planetary system formation and evolution from the earliest epochs to today	Explore the origin and evolution of the galaxies, stars and planets that make up our universe
Exoplanet Exploration Program (ExEP) (timescale is up to several yrs)	Generate a census of extra-solar planets and measure their properties	Discover planets around other stars, and explore whether they could harbor life