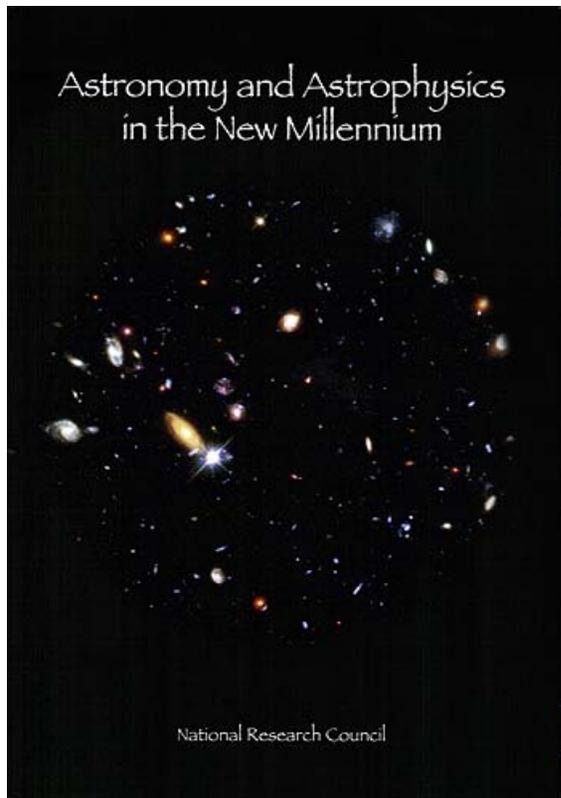


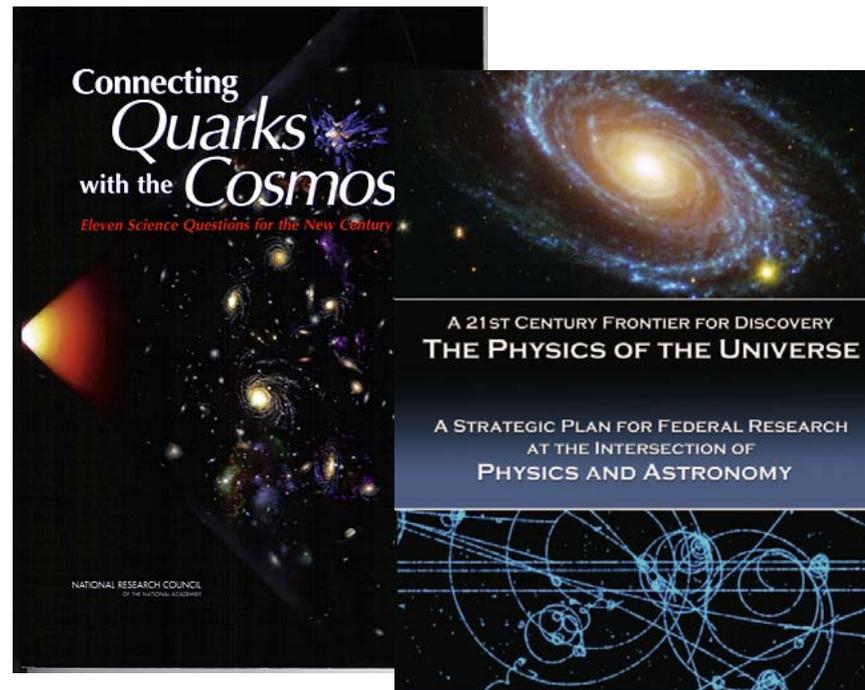
Astronomy and Astrophysics Advisory Committee (AAAC)

Garth Illingworth - University of California, Santa Cruz

Reports: www.nsf.gov/mps/ast/aaac/



March 15 2006 Report



(AAAC - “triple a - see”)

Astronomy and Astrophysics Advisory Committee (AAAC)

Garth Illingworth - University of California Santa Cruz

AAAC Reports and Letters: www.nsf.gov/mps/ast/aaac/

- 2006 report with NASA, NSF, DOE and OSTP selected membership.
- Committee for 2006 report: 13 members - NASA (4), NSF(4), DOE (3), OSTP(2). DOE now fully involved
- Three meetings per year: February (after budget release), May, October plus March telecon to discuss report.
- 2006 report sent as required to Chairs of Congressional committees, and NASA Administrator, NSF Director, Secretary of Energy (DOE); widely distributed to OMB, OSTP, other Congressional committees, agency personnel, and community.

Astronomy and Astrophysics Advisory Committee (AAAC)

Background

- Grew out of OMB and Congressional interest in optimizing return on astronomy investment (cost-effectiveness....) - minimizing duplication of effort
- COMRAA study (NAS Committee on the Organization and Management of Research in Astronomy and Astrophysics) ⇒ explicit recommendation for AAAC-like committee
- Established by Congress in 2002 NSF Authorization Act and formally constituted late 2003 with 13 members selected by NASA/NSF/OSTP
- Informal DOE involvement until H.R. 4516 ⇒ formalized DOE role as from 03/15/05: 13 still, selected by NASA(4), NSF(4), DOE(3), OSTP(2)
- Report submitted by March 15 of each year to Congress & Agency Directors/Administrators - first report March 2004.

Astronomy and Astrophysics Advisory Committee: Charge

(1) assess, and make recommendations regarding, the coordination of astronomy and astrophysics programs of the Foundation and the National Aeronautics and Space Administration, and the Department of Energy;

(2) assess, and make recommendations regarding, the status of the activities of the Foundation and the National Aeronautics and Space Administration, and the Department of Energy as they relate to the recommendations contained in the National Research Council's 2001 report entitled "Astronomy and Astrophysics in the New Millennium", and the recommendations contained in subsequent National Research Council reports of a similar nature;

Updated 2004 language for DOE inclusion

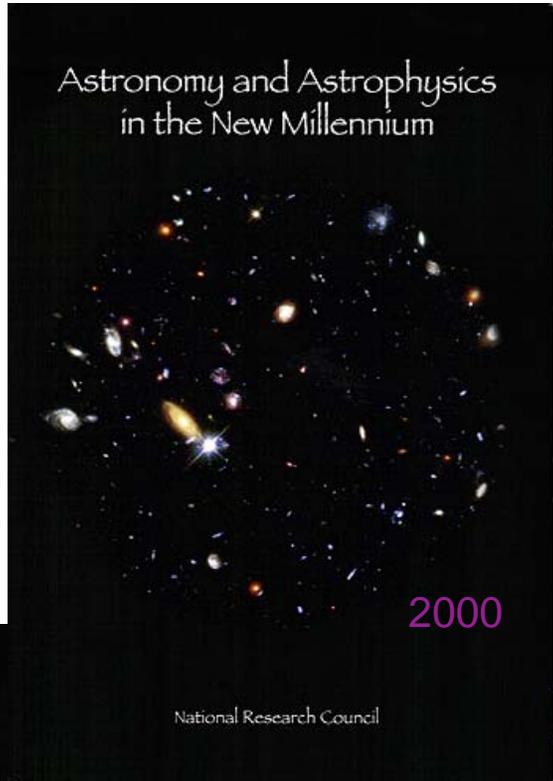
Astronomy and Astrophysics Advisory Committee

MEMBERSHIP LIST (2006 Report)

Garth D. Illingworth (Chair)	University of California, Santa Cruz
John Carlstrom (Vice-Chair)	University of Chicago
Neta Bahcall	Princeton University
Bruce Carney	University of North Carolina at Chapel Hill
Wendy Freedman	Observatories of the Carnegie Institute of Washington
Katherine Freese	University of Michigan
Robert P. Kirshner	Harvard-Smithsonian Center for Astrophysics
Daniel Lester	University of Texas at Austin
Angela V. Olinto	University of Chicago
Rene A. Ong	University of California, Los Angeles
E. Sterl Phinney	California Institute of Technology
Catherine A. Pilachowski	Indiana University
Abhijit Saha	National Optical Astronomy Observatories

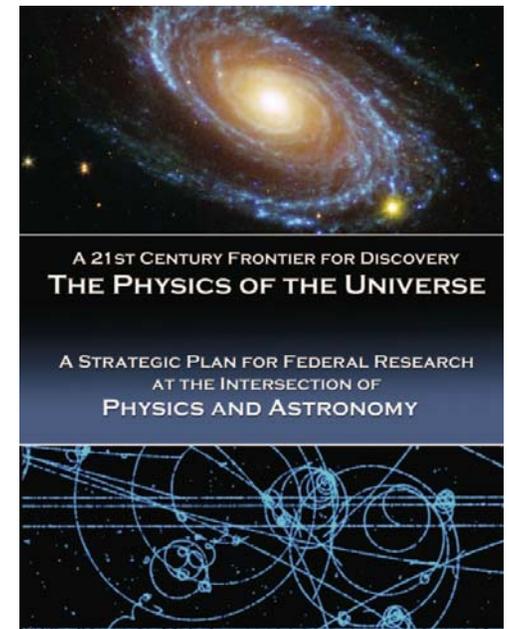
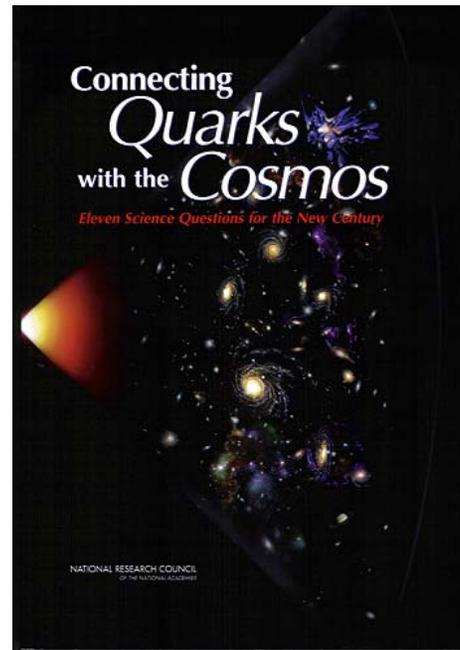
Astronomy and Astrophysics Advisory Committee: Context

AAAC is focused on implementation of Decadal Survey(s), and other comparable NAS/NRC reports, particularly involving interagency coordination.

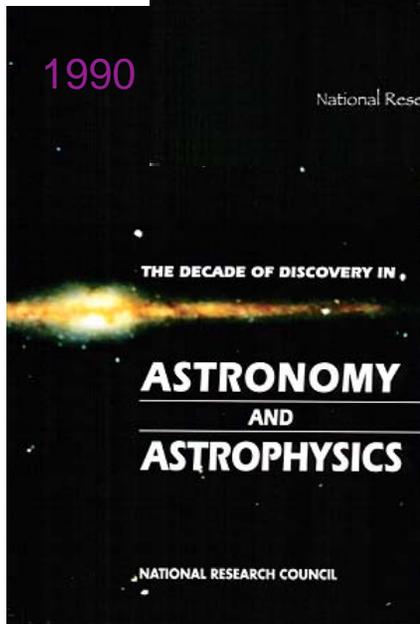


2000

National Research Council



AAAC + HEPAP



1990

THE DECADE OF DISCOVERY IN

**ASTRONOMY
AND
ASTROPHYSICS**

NATIONAL RESEARCH COUNCIL

ExoPTF
ExoPlanet
Task Force

TFCR

Cosmic
Microwave
Background
Task Force

DETF

Dark Energy
Task Force

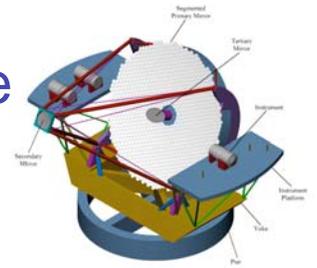
DMSAG

Dark Matter
Science
Assessment
Group

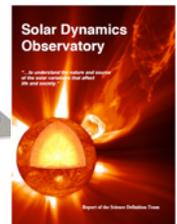
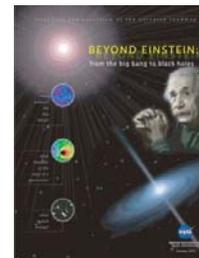
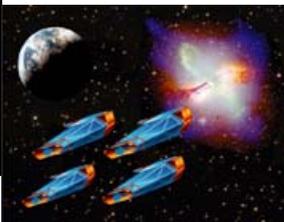
BPA - 04/21/06 - GDI



Astronomy and Astrophysics Advisory Committee March 15 2006 Report.

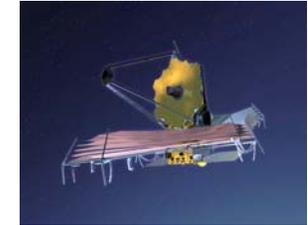
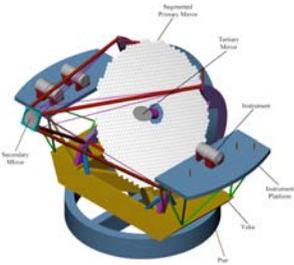


- Recommendations to the agencies re science covered two areas:
 1. Broad recommendations for implementation of overall science program (in areas that impact on Astronomy and Astrophysics)
 2. Specific recommendations for NSF, NASA and DOE projects/programs in NAS studies relating to astronomy and astrophysics
- Report structured with goal of being a resource as issues arise during the year for both global issues and individual key programs in NSF, DOE and NASA.
- Major activities are Annual Report, Dark Energy Task Force, Dark Matter Science Assessment Group, “Lessons-Learned” study, and ExoPlanet Task Force. Impact of Senior Review.

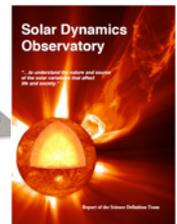
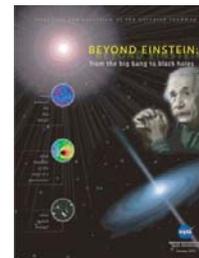
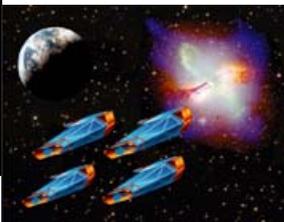


Astronomy and Astrophysics Advisory Committee

March 15 2006 Report.



- Major issue for Astronomy and Astrophysics is budget at NASA. NASA science projected to decrease after inflation. Dramatic change of slope of budget (removing ~\$3B over 5 years) from FY06 to FY07 leads to substantial impact on science program. Severe dislocation to science community research programs - from R&A to Flagship missions.
- Good news is DOE Office of Science up 14% FY07, NSF up 7.9%. Contrast with NASA is large. ACI?

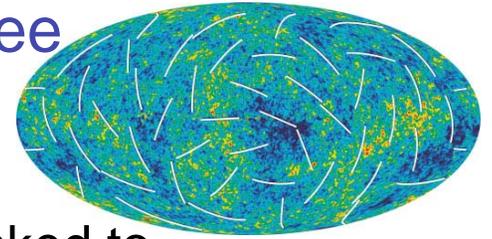


P5 - 04/20/06 - GDI

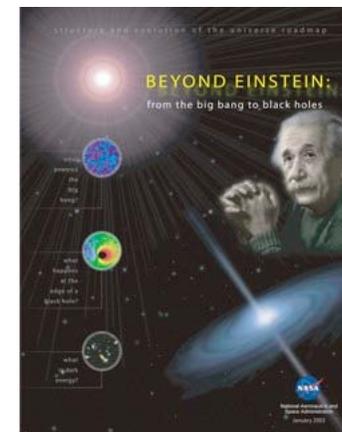
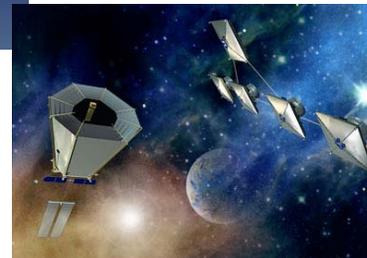
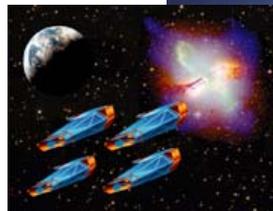
Astronomy and Astrophysics Advisory Committee DOE

- AAAC is very encouraged with the growing involvement of the High Energy Physics Office in the Office of Science at DOE.
- Interactions this last year have been very positive and productive.
- Range of Astronomy and Astrophysics programs is narrow, but some key astrophysical areas.
- Some clear differences in approach (“science culture” differences) but the AAAC has been encouraged by the willingness of the agencies to discuss the differences in approach and to find solutions.

Astronomy and Astrophysics Advisory Committee NASA



- Within the current budget constraints, NASA is being asked to complete ISS, ramp down the existing Shuttle program, and to initiate the Exploration Vision, while retaining a vibrant, broadly-based science program.
- This is a challenge - and science lost out for FY07-11 to STS (shuttle) and ISS (station)
- NASA recommendation: *The AAAC's strongest recommendation this year is that NASA's science funding be restored.*

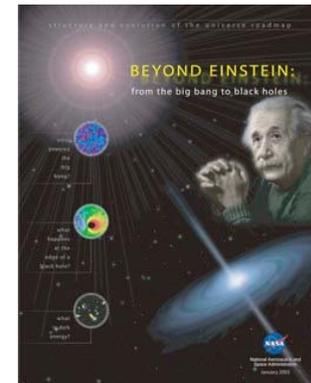
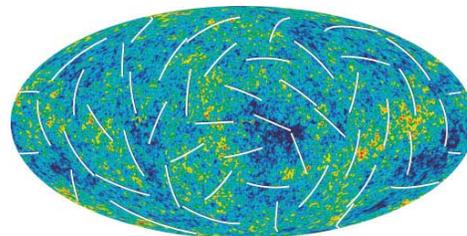


Astronomy and Astrophysics Advisory Committee NASA - lack of advisory committee structure

- The lack of a science advisory process at NASA over the last year has been a great concern - as is the very slow implementation of the new structure (first meeting is May 3/4)
- The NASA advisory process has been a mainstay of a productive and mutually beneficial relationship with the space and earth science community, including the astronomy and astrophysics community. The AAAC considers effective advisory committees to be essential for developing consensus and support for an effective science program.
- The AAAC is also concerned that the new structure may not be as effective in its ability to offer advice to SMD on the science program as was the old structure

Astronomy and Astrophysics Advisory Committee NASA - the issue of balance....

- The cuts to the NASA science budget will severely impact Astrophysics and lead to a serious imbalance in the astronomy and astrophysics program. As noted above, the AAAC recommends that NASA's science funding be restored to its FY 2006 level.
- The balance between small, medium and large programs in the NASA Astrophysics Division has been greatly undermined in the FY 2007 budget request. The AAAC strongly supports efforts to increase the funding and to rebalance the program.
- The R&A funds and smaller-scale missions (Explorers) each serve a critical role in supporting the broad fabric of research needed for realizing the science from future large missions and in enabling the development of the necessary personnel and skills.



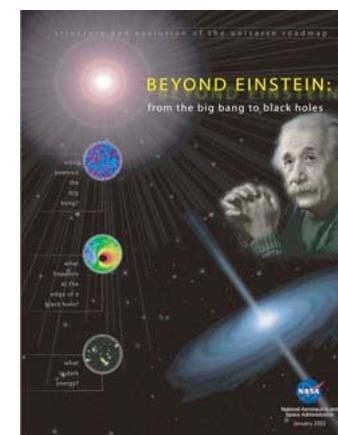
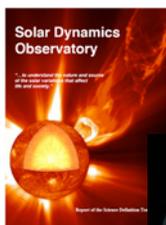
Astronomy and Astrophysics Advisory Committee NASA - the issue of balance....

NASA has sequenced the large Astrophysics missions as HST, JWST then SIM. Yet, the current SIM budget is high, and the funding profile is steep, for a mission that is 9-10 years from launch. As a result, lifecycle costs for SIM are several times the recent re-scope level of ~\$1B. The AAAC strongly recommends increasing the overall budget for SMD, but if the increases are inadequate, some consideration should be given to a more appropriate, lower level of current support for SIM.

Astronomy and Astrophysics Advisory Committee

NASA - Flagships + preparing for the next generation of Flagships

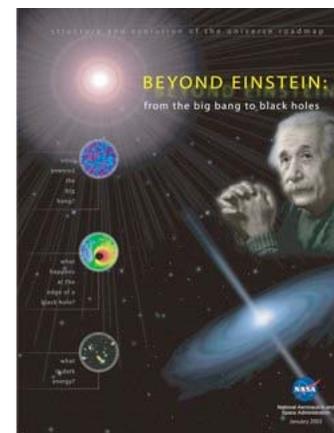
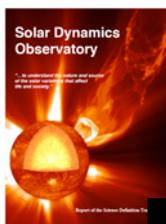
- Flagships like JWST are very important - great science and public visibility (HST!)
- Committee is very concerned that JWST cost not grow further - but also recognizes that lifecycle costs are substantial (HST: \$7.5-9B; Chandra: \$2.8B (**\$3.7B**); Cassini: \$3B; Spitzer: \$1.3B; JWST: \$4.5B; SIM: \$3.4B; SOFIA: \$2.6B)
- Flagship missions are costly -- crucial to pick missions whose science and public visibility will be commensurate with the cost.



Astronomy and Astrophysics Advisory Committee

NASA - Flagships + preparing for the next generation of Flagships

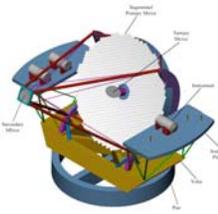
- This is a challenge if there are no funds for conceptual and technology development.
- **Flagship missions happen rarely. Thus, it is crucial that the right choices be made in the Decadal Survey.** For this to happen, a modest but consistent level of funding is needed for major programs to develop the required level of technical maturity and realistic cost estimates. The AAAC strongly recommends that the conceptual and technology development funding for missions such as Con-X, LISA, and TPF be increased to at least ~\$10M per year.



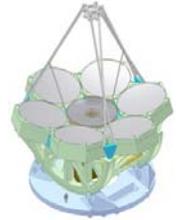
NASA & the American Competitiveness Initiative (ACI)

- The AAAC was very encouraged by the announcement of ACI - but somewhat bewildered, as many were, by the cuts in NASA basic research
- The AAAC noted: *Cuts to the NASA science budget have broad impact and seem very inconsistent with the broad goals of the American Competitiveness Initiative (ACI). In the FY 2007 budget, ACI has wisely justified new investments in DOE science and in the NSF that will result in clear benefits in national leadership in science and technology. There is no question that NASA is a major source of science and technology funding, and the agency indisputably supports even the most basic research. This research contributes to the vitality of the national skill set and has been shown to yield important, marketable spin-offs. We believe that the omission of NASA from the ACI plan is inconsistent and rather shortsighted given the visibility that the NASA science program has engendered for science and engineering across the nation and worldwide.*
- The cuts in R&A at NASA significantly offset the increases for basic physical research at DOE and NSF

Astronomy and Astrophysics Advisory Committee NSF

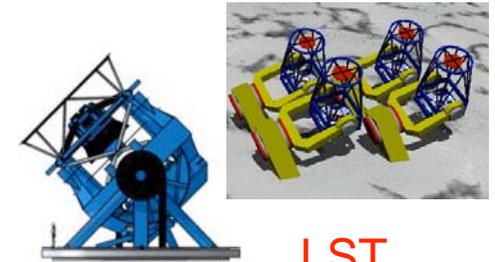


TMT/GSMT



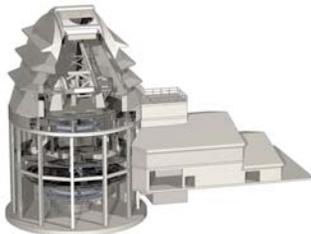
GMT/GSMT

- An effective Major Research Equipment and Facilities Construction (MRFEC) process is of great interest to the astronomy community.
- The multi-stage process for major, high technology projects recommended by the AAAC will make the MREFC program more robust, lessen cost growth during construction and enhance science return during operations.
- “Lifecycle” costing => several phases:
 - (1) conceptual development [Division]
 - (2) pre-construction {Agency}
 - (3) construction MRFEC
 - (4) commissioning {Agency}
 - (5) operations/science return [Division]



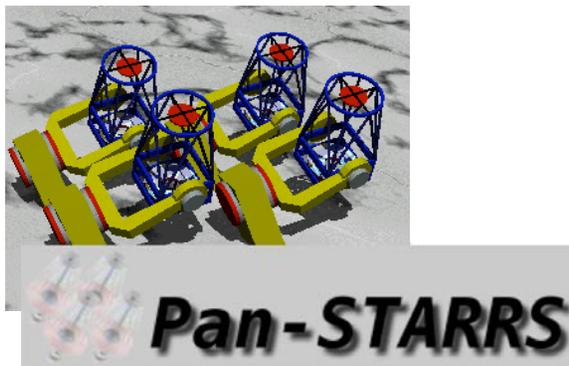
LST

ATST

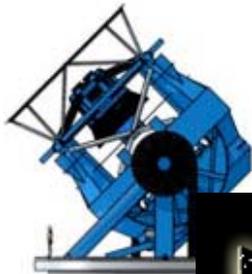


AAAC - Dark Energy Task Force

- Dark Energy has two major programs as its baseline goal - Large Survey Telescope (LST) on the ground and Joint Dark Energy Mission (JDEM) in space. Competitive selection of most cost-effective approaches is a key aspect.
- The AAAC recommended in 2004 that a task force be established to provide a framework for the choices that the agencies will need to make for Dark Energy studies.
- Excellent set of findings - and recommendations soon.... One of the DETF findings will likely significantly influence overall approach :
- *“No single technique is sufficiently powerful and well established that it is guaranteed to address the order-of-magnitude increase in our figure-of-merit alone. Combinations of the principal techniques have substantially more statistical power, much more ability to discriminate among dark energy models, and more robustness to systematic errors than any single technique. Also, the case for multiple techniques is supported by the critical need for confirmation of results from any single method.”*



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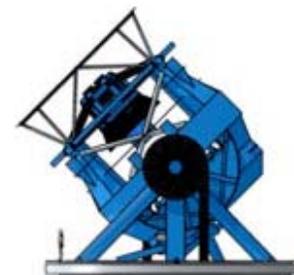
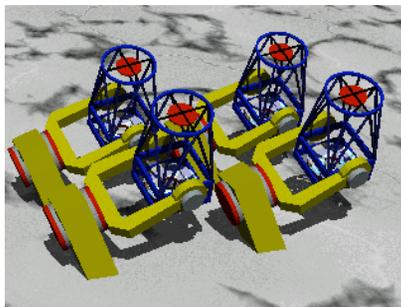


AAAC - Dark Energy Task Force - LST

- Large Survey Telescope LST is generic name for imaging facility with capability for detecting time variable sources and doing a deep imaging survey (current implementations: Panoramic Survey Telescope and Rapid Response System - Pan-STARRS - and Large Synoptic Survey Telescope - LSST).
- Astronomy and Astrophysics Decadal Survey identified LSST as a large program below GSMT and EVLA in priority (LSST: time variable objects; Near Earth Objects NEOs; very deep imaging survey)
- Subsequent added focus on Dark Energy from CQC (weak lensing)
- Major program - with “Lifecycle” costs (development + construction + commissioning + operations) over \$500M
- Construction cost estimate (>\$100M at NSF) will lead to LST going through MREFC process at NSF.



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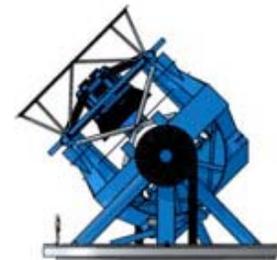
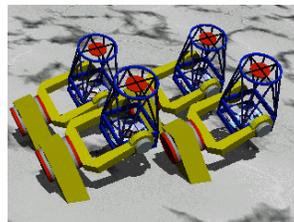


AAAC - Dark Energy Task Force - LST

- Atacama Large Millimeter Array (ALMA) is currently being funded through MREFC - agency and Congress need to deal with increased costs of ALMA construction
- Advanced Technology Solar Telescope (ATST) is currently in readiness phase - likely commencement of MREFC funding in ~2009 (FY2008 budget being worked now..)
- Next program in NSF Astronomy (AST) not likely before FY2010/11? Or later?
- What comes next? GSMT or LST? What about EVLAI? What about SKA?
- Increased funding for NSF from ACI not likely to lead to significant increases in MREFC for some time (if at all....)
- Next Astronomy and Astrophysics Decadal Survey (2010) is 2009/2010 timescale
- Strong feeling in community that that “zero-based” assessment needed of all astrophysics programs => unfinished + new...
- These programs (GSMT, LST, EVLA/SKA..) will be revisited in next Decadal Survey

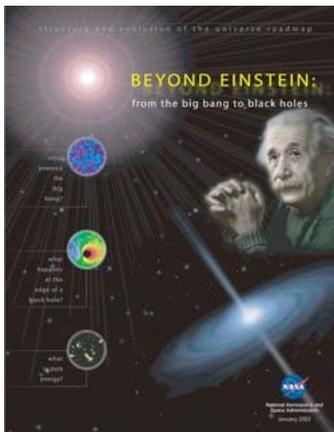


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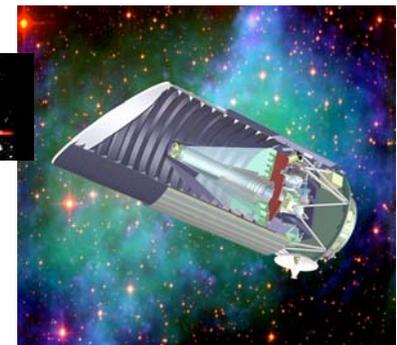


AAAC - Dark Energy Task Force -JDEM

- Joint Dark Energy Mission (JDEM) is space-based program to characterize impact of dark energy on universe.
- SNAP (Supernova Acceleration Probe) was initial mission that underpinned recommendation in CQC. NASA wanted a competitive selection within a new line of moderate-class missions within Beyond Einstein program - called “Einstein Probes”.
- Key aspect agreed to by DOE and NASA was competitive selection of most scientifically cost-effective approach within Einstein Probe cost-cap.
- Cost cap is ~\$600M - this is a challenge!
- Beyond Einstein has minimal funding (only ~\$21M in FY2007) - and includes major missions like X-ray Observatory Constellation-X (Con-X) and Laser Interferometer Space Antenna (LISA) + the Einstein Probes (concepts include CMB polarization, X-ray, dark energy,)



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AAAC - Dark Energy Task Force -JDEM

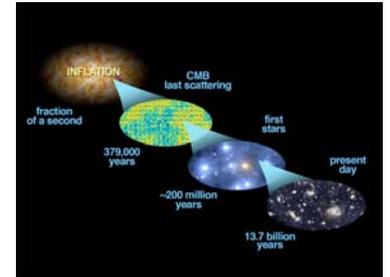
- NASA Universe/Astrophysics Division called for studies of JDEM concepts (decision made last year in strategic planning - “roadmapping” - to make JDEM first of Einstein Probes but this could be revisited?)
- AAAC was also very encouraged by added funds in DOE HEP FY07 budget for SNAP and other concepts
- With current funding profile in Beyond Einstein unlikely to be any significant funds for several years for JDEM
- Astrophysics Division and Advisory committee needs to assess priorities for programs in Beyond Einstein - will priority be given to Con-X, LISA or Einstein Probes?
- NRC is to carry out a study this year on progress on the Decadal Survey in Astrophysics (as required for all Divisions in SMD from language in NASA Authorization from 2005 - Astrophysics is first). May provide guidelines on implementation of program for remaining years until next Decadal Survey
- Need also for agencies and community to consider and discuss implications of DETF recommendations - what is role of JDEM and/or LST and/or SKA?
- Given current budget issues at NASA, resolution of what is in Beyond Einstein and priorities may well be decided by next Decadal Survey in ~2010
- Unlikely to be a start for a JDEM mission until late in the Decade, at the earliest

AAAC - Task Forces and Studies Lessons-Learned Interagency Study

Following discussions with the agencies and OSTP over the last year, the AAAC asked the agencies to consider undertaking a “lessons-learned” activity for carrying out collaborative interagency projects (experience so far with e.g., GLAST, JDEM, VERITAS, CMB experiments etc).

The AAAC, the agencies and OSTP agreed to have a more detailed discussion on the timetable, approach and nature of a lessons-learned report at the May 2006 AAAC meeting.

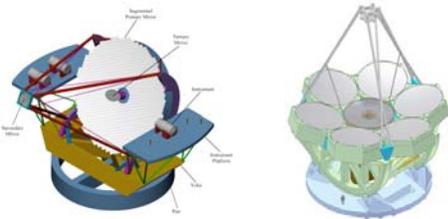
AAAC - Task Forces and Studies Follow-up on Task Force reports?



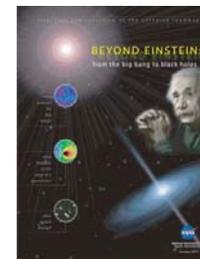
- ❖ TFCR - Task Force on CMB Research - very impressive report delivered in 2005. To NSF/NASA/DOE? What happens next?
- ❖ DETF - Dark Energy Task Force - report to be delivered in soon. To NSF/NASA/DOE. Will be a very important for future planning. Implementation?
- ❖ DM-SAG - Dark Matter Science Assessment Group - report this year. Direct Detection. For DOE/NSF
- ❖ ExoPTF - ExoPlanet Task Force - expect to be formed this year. Searches for extra-solar planets - many techniques - ground and space roles? For NASA/NSF.

How do agencies and community follow-up on these reports.

Astronomy and Astrophysics Advisory Committee Key Issues for 2006/7



- Long-range planning for MREFC (NAS Brinkman report response by NSF) with “Lifecycle” costing and agency support at key phases.
- Support for GSMT technology development - process to take advantage of \$3-500M private funding partnership with NSF. Synergy with JWST
- Funding for a robust, broad space science program in time of change at NASA - a vibrant space science program while ramping down Shuttle and Station, and ramping up Vision activities.
- Long-term vitality of Astrophysics Division programs (issues for R&A, Explorers, JWST, Beyond Einstein, TPF, Con-X, LISA, SOFIA, SIM.....)
- Dark Energy/Dark Matter programs - PoU and DETF recommendations - near-term funding plus plans for LST and JDEM within overall framework
- Implications of Task Force reports/Senior Review - agency response?



Astronomy and Astrophysics Advisory Committee: Congressional Language

EC. 23. ASTRONOMY AND ASTROPHYSICS ADVISORY COMMITTEE.

(a) Establishment.--The Foundation and the National Aeronautics and Space Administration shall jointly establish an Astronomy and Astrophysics Advisory Committee (in this section referred to as the ``Advisory Committee").

(b) Duties.--The Advisory Committee shall--

(1) assess, and make recommendations regarding, the coordination of astronomy and astrophysics programs of the Foundation and the National Aeronautics and Space Administration, and the Department of Energy;

(2) assess, and make recommendations regarding, the status of the activities of the Foundation and the National Aeronautics and Space Administration, and the Department of Energy as they relate to the recommendations contained in the National Research Council's 2001 report entitled ``Astronomy and Astrophysics in the New Millennium", and the recommendations contained in subsequent National Research Council reports of a similar nature; and

(3) not later than March 15 of each year, transmit a report to the Director, the Administrator of the National Aeronautics and Space Administration, the Secretary of Energy, and the Committee on Science of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Health, Education, Labor, and Pensions of the Senate on the Advisory Committee's findings and recommendations under paragraphs (1) and (2).

With updates for DOE inclusion

Astronomy and Astrophysics Advisory Committee: Congressional Language (cont.)

(c) Membership.--The Advisory Committee shall consist of 13 members, none of whom shall be a Federal employee, including--

(1) 4 members selected by the Director;

(2) 4 members selected by the Administrator of the National Aeronautics and Space Administration;

(3) 3 members selected by the Secretary of Energy, and

(4) 2 members selected by the Director of the Office of

Science and Technology Policy.

(d) Selection Process.--Initial selections under subsection (c) shall be made within 3 months after the date of the enactment of this Act. Vacancies shall be filled in the same manner as provided in subsection (c).

(e) Chairperson.--The Advisory Committee shall select a chairperson from among its members.

(f) Coordination.--The Advisory Committee shall coordinate with the Federal advisory bodies of other Federal agencies (such as the Department of Energy, which may) that engage in related research activities.

(g) Compensation.--The members of the Advisory Committee shall serve without compensation, but shall receive travel expenses, including per diem in lieu of subsistence, in accordance with sections 5702 and 5703 of title 5, United States Code.

(h) Meetings.--The Advisory Committee shall convene, in person or by electronic means, at least 4 times a year.

(i) Quorum.--A majority of the members serving on the Advisory Committee shall constitute a quorum for purposes of conducting the business of the Advisory Committee.

(j) Duration.--Section 14 of the Federal Advisory Committee Act shall not apply to the Advisory Committee.

With updates for DOE inclusion