Minutes of the Meeting of the Astronomy and Astrophysics Advisory Committee

26–27 October 2004
National Science Foundation, Arlington, VA

Members attending:	Garth Illingworth (Chair)	Angela Olinto
	John Carlstrom	Rene Ong
	Alan Dressler	Bradley Peterson
	Robert Gehrz	Catherine Pilachowski
	Robert Kirshner	Abhijit Saha
	Barry LaBonte	
Agency personnel:	Wayne Van Citters, NSF-AST	Richard Boyd, NSF-PHY
	Joseph Bordogna, NSF	Vladimir Papitashvili, NSF-OPP
	Eileen Friel, NSF-AST	Al Diaz, NASA-HQ
	Dana Lehr, NSF-AST	Paul Hertz, NASA-HQ
	Michael Briley, NSF-AST	Hashima Hasan, NASA-HQ
	Robert Dickman, NSF-AST	Eric Smith, NASA-HQ
	Craig Foltz, NSF-AST	Zlatan Tsvetanov, NASA-HQ
	Vernon Pankonin, NSF-AST	John Mather, NASA-GSFC
	Elizabeth Pentecost, NSF-AST	Jonathan Gardner, NASA-GSFC
	Randy Phelps, NSF-AST	Robin Staffin, DOE
	Nigel Sharp, NSF-AST	Kathleen Turner, DOE
	Joseph Dehmer, NSF-PHY	
Invited participants:	Bob Palmer, House Science Comm.	
	David Goldston, House Science Comm.	
	Rolf Kudritzki, U. Hawaii	

MEETING CONVENED AT 8:35 AM EDT, 26 OCTOBER 2004

The Chair opened the meeting, and all participants introduced themselves. The June meeting minutes were approved. The Chair reviewed the Committee's recommendations from the previous meeting as well as important issues and events that have since arisen. The Chair reported that pending bill H.R. 4516 would amend the AAAC charter to include the U.S. Department of Energy (DOE) as a recipient of the Committee's recommendations. The charge to the Committee would remain unchanged, but the amended membership selection process would redistribute the 13 member slots among NSF (4), NASA (4), DOE (3) and the Office of Science and Technology Policy (OSTP) (2). If the bill passes, the amendment would take effect on 15 March 2005.

The Chair reported attending recent meetings of the High Energy Physics Advisory Panel (HEPAP) and the National Research Council (NRC) Committee on Astronomy and Astrophysics (CAA) as well as recent visits to OSTP, the Office of Management and Budget (OMB) and the staff of the House Committee on Science, where he discussed the motivation for forming the AAAC as well as the recommendations from the AAAC 2004 annual report. The staff of the House Committee on Science will join the AAAC members for a discussion later in the day. The Chair noted that during his visits, the House staff members identified long-range planning as an

important need at NSF, particularly for large projects in astronomy. Although the astronomy community's decadal survey process serves as an exemplar for planning and prioritizing, the Science Committee remains concerned about NSF-wide processes for identifying, developing, prioritizing and managing projects funded through the Major Research Equipment and Facilities Construction (MREFC) account.

Dr. Wayne Van Citters, Director of the NSF Division of Astronomical Sciences (AST), followed with an update on NSF astronomy and astrophysics programs. Van Citters first reviewed important events occurring since the June meeting. President Bush has nominated Dr. Arden L. Bement, Jr., Acting NSF Director and Director of the National Institute of Standards and Technology (NIST), to succeed Dr. Rita Cowell as the Director of the NSF. The nomination is awaiting Senate approval.

The Enhanced Atacama Large Millimeter Array (ALMA) Project agreement was signed on 14 September 2004, in which the National Astronomy Observatory of Japan formally joined the ALMA collaboration. Japan will manage its program independently of the ALMA baseline project and will deliver a Compact Array (of 16 antennas) and three additional receiver bands in return for ~25% of the observing time on the Enhanced ALMA instrument.

The recommendations of the Aspen Workshop on Future Gemini Instrumentation (www.gemini.edu/files/docman/science/aspen_report.pdf) were endorsed at the recent Gemini Board retreat and will form the basis of the 2006–2010 Gemini strategic plan.

Dr. Van Citters next reviewed major planning activities underway, including: a system-wide survey for ground-based optical and infrared astronomy led by the National Optical Astronomy Observatory (NOAO); a similar effort for radio, millimeter and submillimeter astronomy convened by Associated Universities, Inc. (AUI), the managing organization for the National Radio Astronomy Observatory (NRAO); a strategic roadmap for cosmic microwave background (CMB) research; the development of a Dark Energy Task Force (DETF) that will undertake a similar planning effort for dark energy research; and NSF's response to the 2004 NRC report *Setting Priorities for Large Research Facility Projects Supported by the NSF* (a.k.a. "the Brinkman Report" http://books.nap.edu/catalog/10895.html). Later in this meeting the latter three activities will be discussed in greater detail.

Dr. Van Citters continued by describing NSF's progress on recommendations from both the Decadal Survey and the AAAC annual report submitted March 2004. Smaller-scale initiatives include the development of a joint NSF-NASA request for proposals for the operation and management of the National Virtual Observatory (NVO) as well as support for both laboratory astrophysics and theory programs. Dr. Van Citters noted that the NSF Directorate for Mathematical and Physical Sciences (MPS) will hold a Theory Workshop later this week to discuss science opportunities, modes of support as well as education and training issues.

Dr. Van Citters next reviewed the status of planning and development for large facilities, including the Giant Segmented Mirror Telescope (GSMT), the Large Synoptic Survey Telescope (LSST) and the Advanced Technology Solar Telescope (ATST). Dr. Van Citters reviewed the ATST design and noted recent and upcoming milestones for the project. In the opinion of AST, the ATST Project is ready for consideration for promotion to "ready" status by the MREFC panel and the National Science Board (NSB). Following completion of the construction proposal review, final site selection and preliminary design reviews, the project will be brought to the MREFC panel in March 2005. The current schedule would allow for construction to begin in fall of 2006; design and development funding will continue through FY 2006.

Dr. Van Citters concluded by outlining opportunities for AAAC input into the FY 2007 budget plan.

Mr. Alphonso Diaz, NASA Associate Administrator for Science, joined the Committee to discuss the recent transformation of NASA's organizational structure and strategic planning activities. Mr. Diaz reviewed the events leading to the transformation, beginning with the Columbia Accident Investigation Board Report (http://history.nasa.gov/columbia/CAIB_reportindex.html), which identified both physical and organizational causes for the loss of the Space Shuttle Columbia, through the President's initiation of the Exploration Vision in January 2004 and subsequent findings of the President's Commission on Implementation of United States Space Exploration Policy (http://www.nasa.gov/pdf/60736main_M2M_report_small.pdf). The latter report called for a transformation of NASA's organizational structure to implement the national space exploration vision. NASA was given 30 days to respond.

As a result, NASA's Strategic Enterprises have been restructured into four Mission Directorates to align with the Exploration Vision. Mr. Diaz distributed the organization chart for the Science Mission Directorate, which has three Science Mission Divisions: the Sun-Earth System, the Solar System and the Universe.

Mr. Diaz noted that NASA has asked the NRC to review available decadal surveys and similar science strategy reports and to recommend a set of overarching principles for defining the major scientific goals and roles in the context of NASA's new vision for space exploration. The upcoming November meeting of the Space Studies Board will be dedicated to this discussion. Mr. Diaz also reported that NASA's long-range planning activities will follow three concurrent tracks that include strategic planning roadmaps, technology capability roadmaps and an internal track for assessing core competencies and the role of NASA Centers. The planning activities will all converge in May-June 2005 to provide input to the FY 2007 budget request.

Mr. Diaz and the Committee discussed at length how science will be supported within NASA's new vision and structure. In particular, the Chair asked Mr. Diaz how NASA is responding to concerns about the lack of broad science goals in the new NASA vision and the lack of articulated science in the Level 0 Requirements. Mr. Diaz responded that he recognizes the concern and that NASA is looking at a reformulation of the Level 0 Requirements. Several Committee members also expressed concern about the pace of change and lack of community input during the transformation. Mr. Diaz replied that NASA is committed to an inclusive relationship with its science communities. He expects the current strategic planning process to produce a single, integrated roadmap that will drive the budget. NASA will also ask its current advisory committees to assist with the evolution of its advisory structure.

Committee members also raised particular concerns regarding the Beyond Einstein program and the support of technology development following the cessation of Code R activities. Mr. Diaz stated that he is open to discussing any perceived deficiencies. The Committee also inquired about the impact of Return to Flight activities on the future of the Hubble Space Telescope. Mr. Diaz responded that NASA wants to arrive at a conclusive decision for HST within the next year and that considerable motivation exists at the agency for a robotic servicing mission.

MEETING ADJOURNED AT 10:40 AM – RECONVENED AT 11:00 AM

Dr. Paul Hertz, NASA Assistant Associate Administrator for Science, next provided an update on NASA astronomy and astrophysics programs. Dr. Hertz first reviewed the new organization

charts for NASA management and the Science Mission Directorate. He described the advisory and planning structures and noted that NASA is currently executing 13 strategic roadmaps, several of which are particular to science. As in the past, the NRC will review each roadmap and produce a letter report commenting on the strategic plans in time for input to the budget process. In the new roadmapping process, Dr. Charles Elachi, Director of Advanced Planning, will coordinate the top-level integration of the strategic roadmaps into an integrated agency roadmap that will form the basis for budgets, initiatives and the NASA strategic plan.

Dr. Hertz next reviewed recent significant events. The Terrestrial Planet Finding (TPF) mission has been reformulated to include two complementary observatories; a TPF-Coronagraph will precede a TPF-Interferometer. On 1 October 2004 the Beyond Einstein Formulation Authorization Document (FAD) was signed and the Laser Interferometer Space Antenna (LISA) mission entered Phase A.

Dr. Hertz also provided an overview of the 2004 Senior Review report, as well as an outline of future activities and key issues in the Universe Division. Dr. Hertz noted that the Swift Gamma-Ray Burst mission launch has been delayed to 9 November 2004. Dr. Hertz also reported that the SOFIA mission is behind schedule and over budget and will consequently undergo a technical and cost review as well as a separate operations review. Dr. Hertz concluded with a status report on the developmental and operating missions in the Astronomy and Physics Division.

Dr. Robin Staffin, Associate Director of the DOE Office of High Energy Physics (HEP), followed with an update on HEP programs. Dr. Staffin noted that HEP would like advice from the AAAC on astrophysics and cosmology, specifically in areas where DOE overlaps with NSF and NASA, such as dark energy, dark matter, cosmic rays, gamma rays and CMB measurements.

Dr. Staffin reviewed HEP program news and reported on recent and upcoming interagency planning activities. He noted that the Scientific Assessment Group on Experiments in Non-Accelerator Physics (SAGENAP) reported to HEPAP in September 2004. The Task Force on CMB Research, a joint subcommittee of HEPAP and AAAC, has held several meetings and will report to the two committees no later than May 2005. Members of the NASA/DOE Joint Dark Energy Mission (JDEM) Science Definition Team (SDT), who will lay out the Level 1 Requirements of a space-based dark energy mission, have been selected and will first meet on 15–16 November. In addition, the Dark Energy Task Force, which will report to HEPAP and AAAC on an interagency program for dark energy research, is under development and will report to the committees in summer 2005.

Noting interagency efforts, Dr. Staffin provided an overview of HEP projects that are operating, approved for construction, or under consideration for future development. The Sloan Digital Sky Survey (SDSS, with NASA and NSF) will continue taking data through summer 2005. The Cryogenic Dark Matter Search (CDMS, with NSF) released its first science results in May 2004; the results set the world's lowest exclusion limits on the weakly interacting massive particle (WIMP) cross-section, ruling out a significant range of neutralino supersymmetric models. Other interagency projects he noted included the Gamma Ray Large Area Telescope (GLAST, with NASA), the Pierre Auger high energy cosmic ray detector array (with NSF), the Very Energetic Radiation Imaging Telescope Array System (VERITAS, with NSF and Smithsonian) and the Alpha Magnetic Spectrometer (AMS, with NASA).

Dr. Staffin also described the DOE-HEP FY 2004 funding allocation, in which $47M (6% of the total HEP budget) supported non-accelerator based physics and $49M (6%) supported theory programs. Dr. Staffin compared these amounts to both the FY 2003 budget and the FY 2005

budget request. Non-accelerator physics will drop to $43M in the FY 2005 budget request, $1M below the FY 2003 funding level.

The Chair asked for any concerns that the AAAC may help to address. Dr. Staffin and Dr. Kathy Turner replied that the AAAC could help in defining a process to prioritize future projects. The Chair noted that the Dark Energy Task Force may provide an interesting model for providing this sort of advice.

The Chair then outlined potential items for the Committee's upcoming discussion with House Science Committee Staff, including the transformation of NASA and the support of science at NASA, NSF long-range planning, public-private partnerships in support of large projects such as LSST and GSMT, the future impact on appropriations of the NSF budget doubling authorization, and soliciting the staff members' thoughts on what advice and assistance the AAAC can provide to Congress.

MEETING ADJOURNED AT 12:40 PM – RECONVENED AT 1:40 PM

Dr. Bob Palmer, Minority Staff Director for the House Committee on Science, joined the AAAC for an informal discussion. Dr. Palmer first provided an overview of House committees with jurisdiction over science. In particular, the Science Committee has jurisdiction over all non-defense federal scientific research and development (R&D). The primary Appropriations subcommittees that impact science funding are the Subcommittee on the Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies (VA-HUD) and the Subcommittee on Energy and Water Development. Dr. Palmer noted that cross-cutting initiatives often involve several Appropriations subcommittees and that for these activities jurisdictional issues may be difficult.

Dr. Palmer encouraged the AAAC to distribute its annual reports as widely as possible and offered to help identify relevant recipients. Dr. Palmer declared that the first annual report was "right on track" in providing necessary advice and in monitoring interagency coordination in executing the NRC decadal survey. Dr. Palmer noted that the report would benefit from more consideration of the role of international collaborations in pursuing activities in astronomy and astrophysics. The Chair noted that this focus is not articulated in the formal charge to the AAAC but that the Committee does consider international efforts in the context of individual projects.

Mr. David Goldston, Chief of Staff for the House Committee on Science, joined the discussion.

Dr. Dressler asked the Science Committee Staff how the new Exploration Vision and the subsequent transformation of NASA have been received on the Hill. The Staff members agreed that no evidence exists that Congress has "signed on" to the Exploration Vision, but next year's authorization bill will be the first opportunity for Congress to debate the transformation's impact. Mr. Goldston noted that "NASA should be a science agency with multiple visions" and that the desire will be to see the Exploration Vision discussed so science remains a priority at NASA. Dr. Palmer noted that the current fiscal reality will create a difficult climate in which to implement the Exploration Vision without cutting current science programs. Mr. Goldston concurred and noted, "Congress has not yet made these tough decisions."

Mr. Goldston explained that it will be important for the science community to provide a closely argued, analytical and well reasoned document that articulates the implications of cuts in science funding. Dr. Palmer added that members of Congress want to see coordination of space-based and ground-based facilities.

Dr. Pilachowski noted that funding earmarks have been imposing priorities on science that often fall outside of the consensus priorities developed in community-based planning processes like the decadal survey. She asked if an avenue exists for the AAAC to be involved in the processes that impact earmarks. Both Staff members agreed that earmarks are subject primarily to political processes and that the AAAC likely cannot add anything useful within the political avenues that create and contain earmarks. Similarly, Mr. Goldston noted that the Exploration Vision for NASA was generated through a perfectly appropriate political and policy process; that is, while one may debate the policy itself, it would be inappropriate to criticize the Exploration Vision "because it doesn't come from scientists." He remarked that science can benefit from similar arguments to those provided for the Exploration Vision since science "competes with or beats" human exploration as a useful driver for excitement, education and vision.

The Chair asked how the decadal survey priorities might be implemented within current budget constraints. Dr. Palmer and Mr. Goldston agreed that there is broad belief on the Hill that science is a social good with no political downside and that no reasons other than fiscal realities are driving lean budgets for science. Both noted that the NSF MREFC account has drawn intense oversight but assured, "The deficit drives the budget." Mr. Goldston identified long-range planning as "extremely important" for NSF and asserted that planning documents such as the DOE Office of Science report *Facilities for the Future of Science: A Twenty-Year Outlook* (www.sc.doe.gov/Sub/Facilities_for_future/20-Year-Outlook-screen.pdf) "strengthen the ability of science to walk into the political process" by providing both prioritization of activities and evidence that a planning process was undertaken. He noted, "Somebody has to make the hard choices," and added that it is "enormously helpful" for scientists to make these decisions.

The Chair observed that involving private contributions in large science projects may require a very different process at NSF that could involve up-front commitments to long-range operations funding. Dr. Palmer replied that some models for long-range commitments exist in Department of Defense processes. He added that, while commitments that impact the annual budgeting process will always raise concern, a logical role exists in the authorizing bills to set those kinds of long-range policies. Mr. Goldston added that this issue is "not a novel problem" and that private involvement is generally perceived as positive. Dr. Palmer agreed and noted that the International Space Station provides a working model for international collaborations with long time horizons.

MEETING ADJOURNED AT 3:00 PM – RECONVENED AT 3:20 PM

Dr. Nigel Sharp, AST Program Director for Extragalactic Astronomy and Cosmology, provided an update on the activities of the Task Force on CMB Research (TFCR). Dr. Sharp reminded the Committee of the TFCR charge, chair and membership and reviewed the schedule of meetings (June 1–2, July 29–30, October 2 and November 12–13). He reported that the task force has produced a draft CMB research timeline and bullets of priority items for NASA roadmapping activities, as well as a draft report outline and section writing assignments. A full draft report is expected to be ready one week prior to the next AAAC meeting.

Dr. Sharp outlined concerns arising from the TFCR, including funding worries following the cessation of NASA Code R technology development, the stability and continuity of CMB research groups, as well as the limited input that was received in response to requests for community comments on the TFCR activity. Dr. Sharp noted that the task force plans to solicit more community input through the American Astronomical Society (AAS) newsletter and possibly a special session at the January AAS meeting. Dr. Hertz responded that the NASA Science Mission Directorate must prioritize $200M of ex-Code R activities; that is, if technology

development for CMB research is a high priority item, it must replace other technology development activities. He noted that the NASA scope has increased without a concurrent increase in budget and that technology development funding has been reorganized.

Dr. Sharp reviewed the TFCR draft report outline and noted that all TFCR meeting presentations and documents are available online at http://emvogil-3.mit.edu/~weiss/cmbpolarization/.

Dr. Van Citters followed with an update on activities to establish the Dark Energy Task Force (DETF) as a joint subcommittee of AAAC and HEPAP to advise NSF, NASA and DOE on the future of dark energy research. Dr. Van Citters reminded AAAC members of the background and motivation for the DETF before presenting a draft charge for the task force. He noted that the formation of the task force is needed quickly if their advice will impact the FY 2007 budget process.

Committee members discussed the draft DETF charge letter and provided a list of potential task force members as well as a list of those who would serve as an effective Chair. The Committee identified a subset of its members (Dr. Carlstrom, Dr. Olinto, Dr. Kirshner and Dr. Illingworth) to assemble the proposed changes to the DETF charge letter and to provide a revised draft on the next meeting day. The Committee reached consensus that a two-step process may be needed to provide more immediate advice for the FY 2007 budget process as well as a more comprehensive, considered view of both near- and intermediate-term dark energy research. The members also agreed that the DETF will need to assess carefully the reality of mission capabilities in contributing to measurement of dark energy parameters.

Dr. Paul Hertz distributed a letter from Dr. Joel Bregman, Chair of the Science Archive Working Group (SAWG), which requested that Dr. Hertz and Dr. Alan Smale, NASA Program Executive for Mission Operations and Data Analysis, provide "a general statement of NASA policy regarding the archiving of ground-based data." The letter additionally asked "if the AAAC has formulated any policies that might be germane, and whether there is a vision for the formation of the badly needed archives for ground-based observatories, which account for most of the astronomical data." The Committee agreed to consider the issue as an agenda item at their February 2005 meeting.

The Committee also selected a subset of its members (Dr. Peterson, Dr. Dressler and Dr. Gehrz) to review the draft white paper that was provided to the Committee in preparation for the next day's discussion on potential synergies between the ground-based Giant Segmented Mirror Telescope (GSMT) and the space-based James Webb Space Telescope (JWST).

MEETING ADJOURNED AT 6:05 PM, 26 OCTOBER 2004

MEETING RECONVENED AT 8:40 AM EDT, 27 OCTOBER 2004

The Committee began with a discussion of the draft GSMT-JWST synergy white paper. The Committee suggested that the document be restructured to provide a brief executive summary, suitable for Congressional Committee staffers, as well as a concise, focused document for more technical audiences. The Committee also suggested that the document should draw more fully upon the successes of utilizing ground-based data in association with data from the Hubble Space Telescope as an analogy for GSMT and JWST.

Dr. Van Citters next reviewed major components of the NSF response to the Brinkman Report. He explained that, to date, the NSF response embraces the spirit of the Report's primary recommendations and has been endorsed by the National Science Board (NSB), but the identification of more detailed mechanisms must follow.

Dr. Van Citters noted that the Report calls for an open process with well defined criteria and with a maximum of community input. The Report also recommends that the results of the final prioritization of MREFC projects be discussed, explained and documented. NSF concurs with these recommendations and is making the necessary changes to its processes to ensure that decisions are clearly documented and explained and that selection criteria are clearly articulated.

Dr. Van Citters reported that, in response to the Brinkman Report's call for an MREFC "roadmap," NSF will develop an agency-wide Facility Plan that will report on all major facilities under construction and in various stages of development. The Facility Plan will contain an extensive discussion of the scientific objectives and opportunities that provide the context and compelling need for facilities. In addition, the Facility Plan will provide an overarching, cross-discipline context for assessing the value of a proposed facility in comparison to other investments.

Dr. Van Citters described the various stages of project evolution that will precede and define the process of MREFC project selection, as well as the ranking criteria that will be applied to control a project's progress through the stages of project evolution. As part of the annual budget preparation, the NSF Director will propose funding for some subset of the prioritized, NSB-approved pool of New Start Candidates, as budget constraints permit. Observations and considerations used by the Director and the NSB to rank one large facility project over another for inclusion in NSF's annual budget requests will be clearly and publicly described so that policy-makers and research understand the rationale for the decisions.

Dr. Van Citters reported that the NSF also endorses the Brinkman Report's recommendations to provide researchers with access to funding that is sufficient to develop compelling research agendas, to refine and prioritize their facility requirements, and to complete R&D on facility designs and needed technologies. The level and form of funding for planning and development will be reviewed, and an evaluation will be made of how project funds are best invested to attain robust plans and schedules with better cost projections, so only well defined and thoroughly costed projects are brought forward for NSB consideration.

Dr. Van Citters stated that AST is well placed to function within this framework with an existing flow-down from science to AST action. The Chair questioned how the proposed project evolution criteria will couple with the recommendations and prioritizations of the decadal survey. Dr. Van Citters replied that AST needs an allowance, with community input, for practical considerations such as technical readiness. As an example, he noted that while ATST is lower ranked than both GSMT and LSST in the decadal survey, ATST is ready to go forward when no other MPS facilities projects are in the MREFC queue.

Dr. Michael Briley, AST Program Director for Stellar Astronomy and Astrophysics (SAA), next provided an overview of NSF support of extrasolar planet studies. He identified the areas of support for extrasolar planet studies, including instrumentation [through the Advanced Technologies and Instrumentation (ATI) program] as well as planet formation theory and extrasolar planet searches and observations [through the SAA theme of the Astronomy and Astrophysics Research Grants (AAG) Program]. Dr. Briley provided examples of research awards and results in each of these areas as well as funding levels and success rates for FY 2002–

2004. In FY 2003-2004, exoplanet studies comprised 13% of the SAA program budget of $9M. Dr. Briley also offered that informal coordination with NASA includes the mutual identification of funded proposals and principal investigators.

Dr. Zlatan Tsvetanov, Terrestrial Planet Finder (TPF) Program Scientist, followed with an overview of NASA planet finding activities. He first identified the planet finding missions and their context within the scope of the Exploration Vision. Dr. Tsvetanov reviewed the four indirect planet detection methods and noted that NASA supports activities in all four. He continued to describe the major projects, including the Keck Interferometer, the Large Binocular Telescope Interferometer (LBTI), the Kepler Discovery-class mission, the Space Interferometry Mission (SIM), and TPF. Dr. Tsvetanov noted that the current architecture for TPF calls for two missions: a visible light coronagraph and an infrared interferometer.

The Chair stated that NASA clearly has a robust and broadly based program for planet searches, including components on the ground. He asked if NASA has considered a response to the CAA letter report (distributed earlier to the Committee) that reviews the science goals of the current TPF projects and states that the plan for TPF-C is inconsistent with the 2000 decadal survey's recommendations regarding TPF. Dr. Tsvetanov replied that a draft response has been prepared with an expected October release date. The Chair noted that the CAA expressed particular concern about the potential impacts on other programs prioritized by the decadal survey of a two-mission architecture for TPF and an expedited schedule for TPF-C.

MEETING ADJOURNED AT 10:45 AM – RECONVENED AT 11:00 AM

Dr. Robert Dickman, AST Radio Astronomy Facilities Unit Coordinator, provided a status report on U.S. radio astronomy facilities to provide a context for the newly initiated system-wide, community-led assessment of radio astronomy. Dr. Dickman first reviewed the motivation that led to the assessment; the assessment is both complementary to the NOAO system-wide survey for ground-based optical and infrared (O/IR) astronomy and responsive to the Brinkman Report's call for NSF-wide roadmapping activities. Both surveys will be used as input to AST's upcoming Senior Review process, and a resulting, integrated AST facilities roadmap will be presented to the CAA for comment.

Dr. Dickman reviewed the NSF support for radio astronomy, including budgets, user demographics, and notable science highlights. National Centers, including NRAO and the National Astronomy and Ionosphere Center (NAIC), provide unique, world-class instrumentation with merit-based community access. The University Radio Observatories (UROs) provide typically unique or innovative instrumentation, as well as a critical educational role as centers of intellectual excellence and training in instrumentation. NSF support for radio astronomy also includes Electromagnetic Spectrum Management and support of individual investigators through ATI, AAG and other NSF research directorates and offices (such as the Office of Polar Programs, the Division of Atmospheric Sciences and MREFC).

Dr. Dickman described both operating and new construction budget challenges for the National Centers and UROs and emphasized that historically the most vulnerable area is operations rather than construction costs. He noted that 75–85% of the Center budgets are salary, which presents a critical need for long-term planning to match the long lead times required by salary-loaded budgets. Dr. Dickman showed the FY 1992–2003 inflation-adjusted operations funding levels for radio astronomy facilities; the funding profile clearly demonstrated that operating funds have remained generally flat despite new facilities coming online. Dr. Dickman also reviewed the baseline project, leadership and Enhanced project for ALMA. He noted that the implementation

of the decadal survey recommendations presents very serious budget challenges that will require considerable, sober input from the community through a Senior Review process.

Dr. Dickman concluded with a description of the radio community self-assessment that will provide input to the AST Senior Review. Dr. Martha Haynes will Chair the activity, which will be coordinated by AUI under a 6-9 month timeframe. The assessment will likely assume level budgets and strong competition for MREFC construction funds and must account for operations costs of both existing and new facilities. The assessment will: develop a strategic plan for maintaining U.S. leadership in radio astronomy, with a balance of university, national and international investments, along with support for the U.S. community; and suggest time frames for decisions on new facility construction starts, R&D support starts and closures of less productive facilities.

Dr. Joseph Bordogna, NSF Deputy Director, joined the Committee. Dr. Bordogna remarked that he appreciates the input that the AAAC provides to the NSF and requested that the Committee offer its "honest review" of NSF activities.

Dr. Bordogna stated that NSF management and the NSB are in agreement in responding to the Brinkman Report and that the prioritization process will be the most important outcome. He expects that NSF's response will be available within a few weeks and that a management oversight guide and draft Facility Plan will be developed by the end of the year. Dr. Bordogna observed that other (non-AST) NSF communities will have a harder job ahead since the AST research community already has a well developed long-range planning process in place.

Dr. Bordogna also stated that NSF has developed a robust budget planning construct in response to the NSF Authorization Act of 2002 (P.L. 107-368), which directed the NSB to prepare a report to address the Foundation's budgetary and programmatic growth provided for by the [budget doubling] Act. (See NSB Report 04-15, *Fulfilling the Promise: A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation*, at http://www.nsf.gov/nsb/documents/2003/nsb03151/coverlink.pdf.) Dr. Bordogna reviewed the NSB recommendations from *Fulfilling the Promise* as well as the NSF budget planning focus: broadening participation in the science and engineering workforce, strengthening core disciplinary research and increasing the funding rate for research grants, providing broadly accessible cyberinfrastructure and world class facilities to enhance research performance, and maintaining organizational excellence in management practices. He noted that the proposal funding success rate has decreased from 33% in FY 2000 to 24% in FY 2004 while the number of submitted proposals has increased 49% over the same time period.

In response to an inquiry from the Chair, Dr. Bordogna stated that the NSF Facility Plan will be completed by the end of the year but will be public only following the March NSB meeting. He expects that "everything should be in place" by mid-2005. Dr. Kirshner asked how NSF will respond to the grim budget outlook, to which Dr. Bordogna responded, "First, do no harm." He continued to explain that NSF will be ready for investments when the budget outlook improves and that we must sustain the value of NSF on the Hill. The Chair asked for Dr. Bordogna's thoughts on public-private partnerships. Dr. Bordogna replied that promoting partnerships is one of three integrative strategies for NSF and that public-private partnerships will require an innovative approach.

Dr. Rolf Kudritzki, Chair of the GSMT Science Working Group (SWG), provided an overview of the GSMT-JWST synergy white paper. The document identifies the unique capabilities of JWST

and GSMT, describes their complementary objectives, and identifies science programs that require contemporaneous operations of the two observatories.

Dr. Kudritzki reviewed three key science themes that require GSMT: detecting the emergence of large scale structure in the Universe; observing the building blocks of galaxies and determining the early evolution of chemical elements; and directly observing hundreds of extra-solar giant planets and the disks from which they form. Dr. Kudritzki noted that GSMT science complements JWST key science themes with the ability to observe in the optical and to obtain both high resolution spectra in the near and mid-IR and higher spatial resolution. In return, JWST follow-up to GSMT work takes advantage of JWST's unique capability for high sensitivity broad band IR imaging with wide dynamic range and with no gaps in wavelength coverage. He provided examples of specific science themes for which JWST and GSMT demonstrate complementary objectives and concluded with proposed plan of action to develop common science themes.

The Committee thanked Dr. Kudritzki and the GSMT SWG for their work on the white paper and provided input for a revised document. Dr. Kudritzki proposed that he and his group will iterate the document based on this feedback and will then provide the document to the JWST SWG for input with the intent to provide a revised document at the February AAAC meeting. Dr. Dressler, Dr. Gehrz and Dr. Peterson will monitor progress on this activity.

MEETING ADJOURNED AT 1:20 PM – RECONVENED AT 1:50 PM

The Chair concluded the meeting with general discussion and the identification of action items and issues for future consideration.

Committee members agreed to provide suggested members for the DETF on a short timescale. The Committee recommended that task force members should be chosen to avoid major conflicts of interest (such as principal investigators on large dark energy projects) but that more minor conflicts should be judged based on the need for expertise and balance. The Committee provided edits to the draft DETF charge letter for the agencies' consideration.

The Committee further discussed the NASA planet finding presentation and agreed to support the concerns voiced by the CAA letter report about TPF's potential impact on the decadal survey priorities.

The Committee identified NASA support of technology development following the cessation of Code R activities as an agenda item for a future meeting.

The Committee agreed to author letters to Dr. Bordogna and Dr. Diaz to thank them for participating and follow up on their discussions with the Committee.

The Chair noted that planning should begin to maintain the continuity of the AAAC following the anticipated inclusion of DOE after 15 March 2005.

MEETING ADJOURNED AT 3:00 PM, 27 OCTOBER 2004