Minutes of the Meeting of the
Astronomy and Astrophysics Advisory Committee
28-29 January 2015
National Science Foundation, Arlington, VA

Members attending:	James Buckley	Angela Olinto (Vice Chair)
	William Cochran	Angela Speck (telecon)
	Priscilla Cushman (Chair)	Suzanne Staggs (telecon)
	Craig Hogan	Paula Szkody
	David Hogg	Jean Turner
	Klaus Honscheid	
Agency personnel:	James Ulvestad, NSF-AST	Mangala Sharma, NSF-AST
	Joan Schmelz, NSF-AST	Nigel Sharp, NSF-AST
	Maria Womack, NSF-AST	Sandra Cruz-Pol, NSF-AST
	Elizabeth Pentecost, NSF-AST	Randy Phelps, NSF-OIIA
	Diana Phan, NSF-AST	Jean Cottam, NSF-PHY
	Daniel Evans, NSF-AST	Paul Hertz, NASA
	Claire Cramer, NSF-AST	Dominic Benford, NASA
	David Boboltz NSF-AST	Rita Sambruna, NASA
	Ralph Gaume, NSF-AST	Kathleen Turner, DOE
	Patricia Knezek, NSF-AST	Saul Gonzalez, OSTP
	Glen Langston, NSF-AST	Meredith Proshan, OSTP
	Vern Pankonin, NSF-AST	
Others:	Joel Parriott, AAS	John O'Meara, St. Michaels College
	Josh Shiode, AAS	Paul Schechter, CAA
	Reba Bandyopadhyay, UFL	Roeland Van der Marel, STScI
	Steven Adams	Ben Kallen, Lewis-Burke
	Aleks Diamond-Stanic, UWI-Madison	Jim Lancaster, NRC
	Keivan Stassun, Vanderbilt/Fisk	David Kahe, NRC

MEETING CONVENED 9:00 AM, 28 January 2015

The Chair called the meeting to order. Introductions were done.

The minutes from the 17-18 November 2014 meeting were approved by the Committee.

Elizabeth Pentecost, the AAAC Recording Secretary, reviewed the list of identified Conflicts of Interest (COIs) for the AAAC. There were no additional changes to the list.

Paul Hertz presented the NASA update, including some programmatic and science highlights. The Chandra X-ray Observatory detected a record-breaking outburst from the Milky Way's black hole. NASA has reimaged the "Eagle Nebula, Pillars of Creation" image to celebrate Hubble's 25th anniversary. In 1995 the image was taken with the WFPC2 instrument; in 2014, the image was taken with WFC3/UVIS. NASA's Kepler satellite has now discovered 1,000 confirmed exoplanets and has uncovered more small worlds in the habitable zone.

The Astrophysics Division is addressing the decadal priorities within budget constraints. The FY 2015 appropriation provides funding for NASA astrophysics to continue its programs, missions and projects as planned. The total funding for NASA Astrophysics, which includes JWST, continues at $1.33B, same as

in FY2014. The budget funds JWST to remain on plan for an October 2018 launch. Funds continue for pre-formulation technology work leading toward WFIRST. The budget restores SOFIA to the budget with a 17% reduction from FY 2014. The budget also provides funding for the Science Mission Directorate's education programs.

The Hubble Space Telescope will celebrate its 25th anniversary this year and a wide range of activities will be held including a science symposium, lectures, exhibits at museums around the world, a webcast event at the National Air & Space Museum, and the re-release of the IMAX film, Hubble 3D.

SOFIA was declared operational in May 2014. SOFIA's unique science capabilities, in addition to its mobility, are the spectral region longer than 27 microns and very high spectral resolution. SOFIA completed its heavy maintenance in Germany in December 2014. Cycle 3 investigations will begin in February utilizing all six first generation instruments. Second generation instruments are under development. The FY 2015 appropriation continues SOFIA at a reduced budget level.

The Astrophysics Division is currently in the pre-formulation phase for WFIRST/AFTA. Activities include technology development for detectors and a coronagraph, assessment of the 2.4m telescopes including risk mitigation, mission design trades, payload accommodation studies, and observatory performance simulations. The Science Definition Team (SDT) final report is due on 31 January 2015.

The NASA/NSF partnership for exoplanet research proposes to use the NOAO share of the WIYN consortium to implement a joint exoplanet research program that will focus on high precision radial velocities. This will provide the US astronomical community with open access to a NASA-developed, world-class precision radial velocity facility instrument.

Funding amounts have not kept pace with the number of proposals submitted to the NASA Astrophysics ROSES (research grants) solicitation over the past few years. As a consequence, the selection rate has decreased. The Division will not solicit proposals for the Astrophysics Theory Program (ATP) in FY 2015 to realign the submission of proposals with the release of funding to PIs, but there will be an opportunity in 2016.

Education is funded in the FY 2015 NASA appropriation Act at $42M Science Mission Directorate (SMD)-wide as a separate budget line. SMD will compete and consolidate education activities for FY 2016, and intends to release a Cooperative Agreement Notice (CAN) soliciting team-based proposals for science education.

NASA is planning for the 2015-2016 mid-decade review. The NASA Authorization Act of 2005 requires assessments of NASA's science programs that include mid-decade reviews. The study will be co-sponsored by NASA, NSF, and DOE. The Agencies are in the process of charging the NRC, and formation of the Study Committee will begin soon.

NASA is preparing for the 2020 Decadal Survey. The survey will prioritize large space missions to follow JWST and WFIRST. To enable this prioritization, NASA needs to provide information on several candidate large space mission concepts for consideration by the 2020 Decadal Survey Committee. NASA needs to initiate technology development for candidate large missions so that technology will be ready when needed. The next large mission after WFIRST could be started when funding becomes available as WFIRST approaches launch in the early to mid-2020s. NASA will identify a small set of candidate large mission concepts to study by incorporating community input, and the Astrophysics Division Director will decide which large mission concepts will be studied as input for the decadal survey.

James Buckley was complementary of NASA's process for the planning for the next decadal survey.

Craig Hogan asked what the follow-up plans were for the LISA Pathfinder mission. Hertz replied that it would be ESA-led L3 Observatory. There is a study team looking at what technologies are needed and on what timescale. ESA needs to lock in the member nations investing in the right things even though there is no commitment yet, and NASA wants to invest in a technology that is complementary not redundant. There is a team is looking at what will be expected from the LISA Pathfinder mission.

Kathy Turner gave an update on DOE activities. The U.S. High Energy Physics (HEP) program is following the strategic plan laid out by the previous High Energy Physics Advisory Panel (HEPAP)/P5 (Particle Physics Project Prioritization Panel) studies, but HEP needed a compelling and executable strategic plan with the community behind it. The community-led planning process (Snowmass) to develop a strategic plan for the field was started in 2013. The plan was to be executed over a ten year timescale in the context of a 20-year global vision for the field. The P5 process was carried out in the context of realistic budget scenarios provided by the funding agencies in the charge to the panel. The P5 report was delivered and approved by HEPAP at their May 2014 meeting.

The FY 2015 HEP budget was approved at $766M as part of the Omnibus bill, between P5's scenario A&B and less that what HEP was planning for. The Office of Science approved budget was $5,071M. There was specific language that provided $6.8787M for new Cosmic Frontier MIE projects (LZ, SuperCDMS-SNOLab, DESI). This was less than the ~$11M planned for the reworked plan in response to P5 for the President's budget. The cap for these projects was lifted by the Senate, and all were approved as new project starts.

Through ground-based telescopes, space missions, and deep underground detectors, research at the cosmic frontier aims to explore dark energy and dark matter. The FY2015 budget is $107.56M for the Cosmic Frontier. The Cosmic Frontier has high priority projects ready to go in the near term (DESI and DM-G2) and HEP is working toward getting the additional funds to do DESI and an expanded dark matter program.

Currently the Dark Energy program consists of the Dark Energy Survey (DES), LSST (camera), and DESI. A CD-1 review for DESI is planned for February with a "baseline" CD-2 review in late FY 2015. There are plans to sign an agreement with NSF soon for agreement to start supporting NOAO operations costs in FY 2016, ramping up to full support for dark energy survey operations in FY 2019.

Paula Szkody asked about the data being available from DESI. Kathy Turner replied that DOE is interested in the dark energy science and there are plans to make data releases much like SDSS and BOSS. Klaus Honscheid indicated that details are still being discussed.

James Buckley asked if there was some time pressure to get DESI underway. Kathy Turner replied that there have been other recommendations other than P5 to move DESI forward. It has been important to get new research projects going such as DESI. DOE has agreed to pay for the operations of the Mayall for the DESI project

For dark matter detection, DOE and NSF announced in July 2014 a selection of DM-G2 experiments to move forward to the fabrication phase, ADMX-G2, LZ, SuperCDMS-SNOLab. DOE also funds experiments measuring properties of high energy cosmic rays and gamma rays. There is also an extensive program in direct-detection dark matter experiments and support for CMB experiments.

Considerations for research support include priorities to support efforts in the programs that HEP has responsibility for experiments, working in collaborative arrangements, and increasing university involvement in dark energy and dark matter. The HEP research FY 2015 funding opportunity proposals

are currently under review and PIs will start to be informed of funding decisions soon. The DOE Office of Science graduate research fellowship awards have been made, 65 awards across the Office of Science, with 11 awards in HEP, totaling $1.6M.

Keivan Stassun (Vanderbilt University) asked how funding for the Sloan Digital Sky Survey (SDSS) figures into the HEP planning. Kathy Turner replied that DOE has not committed to the operations of SDSS4 or participation in e-BOSS, but a number of DOE researchers who were participating in BOSS are also participating in e-BOSS and planning for DESI. It is seen as a natural progression but HEP's priority is DESI, and if funds become available will consider e-BOSS.

James Ulvestad presented an update on AST activities. He provided some programmatic and science highlights. The LSST "first-stone" ceremony is scheduled for April 14. The NSF FY 2015 appropriation included a full appropriation at the request level for the NSF Major Research Equipment and Facilities Construction line which include LSST and DKIST. There were several retirements from AST, Craig Foltz who retired January 9 and Gary Schmidt scheduled for retire on March 6. David Boboltz has taken over the National Solar Observatory (NSO) and DKIST. Dan Evans is taking over Gemini and the Gemini competition. AST has an open advertisement for a program officer concentrating on Gemini.

Some science highlights were presented. The Catalina Real-Time Transient Survey detected an apparent periodic variability in quasar PG 1302-102 with a periodicity of ~ 5 years. The periodicity is attributed to a supermassive black binary. The work was published in *Nature* and is one of AST's individual investigator awards. ALMA is in Cycle 2 of early science. More than 1,500 proposals were received from 3,400 investigators. The Gemini Planet Imager (GPI) is producing some very good early science observations. Its observation of HR 8799 indicated that the planets have similar colors but the spectral shapes indicate significant differences in atmospheric clouds or composition. Data from early commissioning runs is coming in now. Arecibo and Goldstone observed the passing of an asteroid 1.2 million km from Earth. It was confirmed as a binary asteroid.

Construction of the Daniel K. Inouye Solar Telescope (DKIST) is well underway. LSST construction began last August. ALMA construction is nearly complete except for some punchlist items. AST is undergoing several management competitions of its large facilities, namely NOAO, NRAO, and Gemini.

The FY2015 PBR was received by Congress in February 2014. AST is not a line item in the budget, it is included in the Research and Related Activities line item. NSF is waiting for Congressional approval of its operating plan. The FY 2015 budget request for AST is $236M. The FY 2016 PBR will be submitted to Congress next week; at present sequestration is still the law, so this may have an effect on what the final numbers will be for AST for FY 2016.

AST has prepared a Dear Colleague Letter (DCL) that is currently in NSF clearance that includes the status of all major, actionable recommendations from the Decadal Survey report plus the status of the Portfolio Review response.

Paul Schechter, co-chair of the NRC Committee on Astronomy and Astrophysics (CAA), gave an update on the progress toward a mid-decade review of the *New Worlds, New Horizons* (*NWNH*) report. NWNH recommended that a committee be convened to review the responses of NASA, NSF, and DOE to previous NRC advice, primarily the 2010 NRC decadal survey. Discussions between NRC, CAA, and the Agencies occurred at CAA meetings, but then in earnest at the November 2014 CAA meeting. Following that meeting, the CAA and NRC developed a study prospectus for the mid-decadal. NASA formally requested the study in November and the study prospectus was approved by NRC in December. The proposals have been submitted to NASA, NSF, and DOE to carry out the study. The study will begin when funding arrives from the NSF and NASA. There is a committee of experts who will hold three in-

person meetings and issue its report 14 months after the date of receipt of funding for the study. The review will: (1) describe the most significant scientific discoveries, technical advances, and relevant programmatic changes in astronomy and astrophysics over the years since the publication of the decadal survey; (2) assess how well the Agencies' programs address the strategies, goals, and priorities outlined in the 2010 decadal survey and other relevant NRC reports; (3) assess the progress toward realizing these strategies, goals, and priorities; and (4) in the context of strategic advice provided for the Agencies' programs by Federal Advisory Committees, and in the context of mid-decade contingencies described in the decadal survey, recommend any actions that could be taken to maximize the science return of the Agencies' programs. The review will not revisit or alter the scientific priorities or mission recommendations provided in the decadal survey and related NRC reports but may provide guidance on implementation of the recommended science and activities portfolio and on other potential activities in preparation for the next decadal survey.

Priscilla Cushman gave a introduction set the stage for the discussion on demographics and the health of the individual investigator grants program. Over the last decade, budget pressures and a steep rise in the number of proposals have had an impact on researchers and funding agencies in the fields of Astronomy and Astrophysics. The decreasing success rate of individual proposals, a general decrease in funding levels in many agencies, and increased reviewer load has been a topic of concern within the community. Consequently, a working group was formed to evaluate the effect of this changing environment on the health of the field, specifically addressing whether this will result in unacceptable restrictions in the range of new scientific initiatives and negatively impact career choices of the most promising researchers. The working group gathered relevant demographic data to understand how the funding environment over the last 10 years has affected researchers and projects, and then compared funding models across agencies to determine appropriate metrics for evaluating success. This information will be part of the AAAC annual report and the final report would be due in late 2015.

David Hogg asked about the frequency of proposal submission. He would like to see a chart that would provide frequency over a three-year period.

James Buckley suggested that a community survey to assess the situation would be useful. Inquiring about the number of proposals PIs submit, how often they submit, etc. would be beneficial in the Committee's assessment of the health of the grants program.
Dan Evans, AST Coordinator for the Astronomy and Astrophysics Grants (AAG) program, provided a wide range of statistical information to the AAAC. The statistics will be used in the demographic report and will be included in the AAAC annual report.

Paul Hertz and James Ulvestad gave a presentation on cooperative programs among NSF and NASA observatories. NASA and NSF observatories have observatory-level agreements to award time on each other's facilities for research requiring multiple observatories. Observing time is awarded by a Time Allocation Committee (TAC) following a regular proposal and review process. Each TAC has a limit on the amount of time that can be awarded on a partner observatory. These partnerships enable individual investigator investigations. For example, Hubble offers joint observations on Hubble and NOAO optical telescopes, NRAO radio telescopes, and ESA's XMM-Newton. Chandra, Fermi, and Swift offer similar joint observations with NSF facilities (Gemini, WIYN, Mayall, SOAR, Blanco, GBT, VLA, VLBA). NRAO offers joint observations on NRAO radio telescopes with Hubble, and Swift. NOAO does not offer joint observations through NOAO TACs, but participates by making time available to space observatory TACs; NRAO participates by making time available to space observatory TACs. Other observatories such as ALMA, and eventually JWST, are encouraged by NSF and NASA to establish appropriate observatory-level agreements to enable the astronomical community's most compelling science investigations.

The next meeting of the AAAC was scheduled for February 27, which will be a teleconference to discuss the annual report.

MEETING ADJOURNED AT 5:00 PM, 28 FEBRUARY 2015
MEETING RECONVENED AT 9:00 AM, 29 NOVEMBER 2014

The Committee spent time discussing the annual report that is due on March 15, 2015. The outline followed what was prepared for the 2014 report. The Chair provided a draft outline of the report that included topics such as science highlights, status of Decadal Survey programs and recommendations, interagency cooperation, budgets and budget impacts, demographics, and challenges and opportunities, will be incorporated into the report. The Committee were given writing assignments for the different sections of the report and asked to provide their input to the Chair with a few weeks so that a draft report could be written and discussed at the February 27 telecon.

MEETING ADJOURNED AT 12:00 PM, 29 FEBRUARY 2015