

<p>Minutes of the Meeting of the Astronomy and Astrophysics Advisory Committee 25 February 2016 Teleconference National Science Foundation, Arlington, VA</p>

Members attending:	James Buckley Craig Hogan Klaus Honscheid Rachel Mandelbaum Angela Olinto (Chair)	William Smith (Vice Chair) Angela Speck Suzanne Staggs Jean Turner
Agency personnel:	James Ulvestad, NSF-AST Chris Davis, NSF-AST Elizabeth Pentecost, NSF-AST Ed Ajhar, NSF-AST Nigel Sharp, NSF-AST	Randy Phelps, NSF-OIA Paul Hertz, NASA Kathleen Turner, DOE Eric Linder, DOE
Others:	Monti DiBiasi, SWRI Joe Pesce, GMU Roeland Van der Marel, STScI Miriam Quintal, Lewis-Burke Keivan Stassun, Vanderbilt/Fisk Benjamin Preis, Lewis-Burke	Paola Castano, Smithsonian, NASM Peter Shawhan, UMD Amaya Moro Martin, STScI Ben Kallan, Lewis-Burke Jason Kalirai, STScI

MEETING CONVENED 12:00 PM EST, 25 February 2016

The Chair called the meeting to order.

Paul Hertz provided an update on NASA activities since the 28-29 January meeting. The LISA Pathfinder satellite was launched successfully on December 3, 2015; it is finishing its commissioning phase and science operations will begin on March 1. The satellite, Hitomi (formally ASTRO-H) was launched on February 17 and renamed after it successfully opened its solar panels. WFIRST passed its formulation initiation review on February 17 and is in Phase A and now is an official NASA project. ROSES 16 was released on February 19, which provides opportunities for the community to submit research proposals to NASA.

The FY2016 appropriation (\$731 million for Astrophysics, \$620 million for JWST) provides \$90 million for WFIRST and directs NASA to start formulation. It also provides full funding for SOFIA operations (\$85 million) and places SOFIA into the 2018 Astrophysics Senior Review; provides full funding for continued Hubble operations (\$98 million); provides \$37 million for Science Mission Directorate STEM education activities; but requires a reduction of \$36 million in the rest of the Astrophysics portfolio.

The FY 2017 President's Budget Request (PBR) for NASA Astrophysics was submitted to Congress on February 9; \$757 million for Astrophysics and \$569 million for JWST. This supports the commitment of an October 2018 launch date for JWST, formulates the WFIRST mission, continues development of the TESS exoplanet mission for launch by FY2018, supports operating missions extensions, subject to the results of the 2018 Senior review, enables down selection of the next SMEX mission and selection of the next MIDEX mission concepts, and increases support for research and analysis. The budget request compares well with the FY2016 appropriation (\$1,351 million excluding STEM) and significantly exceeds the FY2017 notional run out in the President's FY2016 request for NASA Astrophysics including JWST (\$1,276 million excluding STEM). This allows WFIRST to be executed within the guidelines and supports other Decadal Survey priorities such as partnerships with ESA. However, the

Senior Review funding may be inadequate to continue all currently operating missions; the FY2016 budget for six Senior Review missions is \$62 million, the FY2017 Senior Review budget is \$37 million.

James Ulvestad provided an update on NSF activities since the 28-29 January meeting. The FY2017 PBR for NSF is a total increase of 6.5% in the Research and Related Activities account (\$6.425 billion vs. \$6.034 billion for FY 2016) and 6.4% for AST (\$262.61 million vs. \$246.73 million for FY2016). The AST ratio of facility operations costs to small awards would shift slightly toward small awards, with the ratio being similar to that existing prior to the Portfolio Review (2010-2011). The FY 2017 budget fully funds the two AST construction projects, the Daniel K. Inouye Solar Telescope (DKIST) and the Large Synoptic Survey Telescope (LSST). There are two flavors of spending for FY 2017, “Discretionary” which adheres to the two-year budget levels passed by Congress in late 2015, and “Mandatory”, spending that is funded by a dedicated revenue stream, and requires a Congressional action separate from the standard appropriation bill.

The FY 2016 estimate (now in Congress awaiting approval) relative to the FY 2015 actuals keeps the facilities basically flat with some ramp up for DKIST and the National Solar Observatory [one time funding for the Global Oscillations Network Group (GONG) of \$2.5 million]. Budgets for NOAO and NRAO go down. Funding for the Mid-scale Innovations Program (MSIP) goes up by \$6.3 million, from \$12.95 million to \$19.25 million and the program, Enhancing Access to the Radio Spectrum (EARS) drops from \$6 million to \$1 million. The regular grants program is likely to remain steady.

The FY 2017 request relative to the FY 2016 estimate has the Facilities rise about \$5 million with increases for DKIST and ALMA operations. MSIP drops by \$1.25 million to \$18 million. Small awards drop by \$2.5 million in the discretionary request and increase by \$14.88 million in the mandatory request. Mandatory spending is targeted to early career awardees.

In FY 2017, support for several of NSF’s astronomy and astrophysics facilities investments reaches a decision point. Based on AST’s Portfolio review recommendations, NSF is developing several divestment options for some of its facilities. AST’s initial engineering baseline surveys for some of its facilities being considered for divestment will be finalized soon, and based on those studies, AST will be looking at viable options to move forward with partnerships or formal environmental studies that include a variety of viable options that could include partnerships and NSF not funding particular facilities anymore. It is anticipated that for the programs where there needs to be formal environmental studies, those studies would be concluded in late FY 2017 and NSF would at that point come up with formal decisions on those. Because the initial engineering studies are not quite in place yet, NSF cannot make the decisions on which facilities would go into environmental studies and which will not.

Kathy Turner provided an update on DOE activities since the 28-29 January meeting. The enacted FY 2016 budget for HEP is \$795 million. The FY 2017 President’s Budget Request (PBR) for HEP (\$818 million) is up relative to FY2016, \$30 million over the FY 2016 request and \$52 million over the FY2015 enacted budget. The FY2017 HEP request (\$818 million) aims to continue the successful implementation of the P5 strategy. The request is carefully balanced between support for projects, facility operations, and scientific research. The FY 2017 PRB for the Cosmic Frontier is \$130.07 million, slightly below the FY 2016 enacted budget (\$130.58 million).

The U.S.-hosted international Long Baseline Neutrino Facility and Deep Underground Neutrino Experiment (LBNF/DUNE) has made rapid progress in the past year and attracted the interest of international partners. The High Luminosity Large Hadron Collider (HL-LHC) accelerator and detector upgrade projects will significantly extend the discovery research of the world’s highest energy collider. As recommended by P5, a complementary suite of Major Item of Equipment (MIE) projects will address dark matter and dark energy, including LSST, DESI, LZ (Lux-Zeplin), and SuperCDMS-SNOlab. The

Facility for Advanced Accelerator Experimental Tests II (FACET-II) will enable continued R&D in the area of beam-driven plasma wakefield acceleration. The Accelerator Stewardship program will advance U.S. competitiveness in accelerator technology. Included in the FY2017 budget request is \$100M for university grants in the Office of Science as mandatory funding as opposed to the rest of the Office of Science budget.

Recommendations for the university grants research program have gone out with a few still being decided. There is also the Early Career program which is open to university faculty and laboratory scientists. The review panel for the program was held earlier this month with results out in April/May.

NSF, NASA, and DOE talk regularly about program planning, overlaps, and issues related to joint projects. Depending on science, project, contribution, and agency considerations, sometimes DOE/HEP partners on fabrication or provides facilities. There are joint oversight groups for the major projects and group meetings to discuss coordination among the agencies on LSST, Euclid, and WFIRST.

Peter Shawhan (University of Maryland), a member of the LIGO Science Collaboration, gave an update on LIGO and Future Prospects. The focus during the summer of 2015 was to transition LIGO gravitational wave detectors back to observing operations after a 5-year shutdown to carry out the Advanced LIGO upgrade (observing run in Fall 2015 and in Fall 2016). The upgrade was a comprehensive overhaul of all the instrumentation (optical configurations, lasers, etc.) at both sites; this should give the project a factor of 10 lower noise and a 1000 more volume of space searched. Both LIGO detectors were operating well by late August when the engineering run began. The observing run O1 was scheduled to begin on September 14 but was delayed until September 18; all of the calibration was worked out by September 12. One of the on-line waveburst algorithms detected a signal in both of the detectors (LIGO Livingston and LIGO Hanford); it had the form of a binary black hole merger (heavy black holes; 36 and 29 solar masses). Observations were made by about two-dozen of the partner groups and a paper is being written but not published yet; reports have been made by seven of the groups so far on their observations. There have been about dozen papers written on the event. The event proves that there are black hole binaries out there, orbiting closely enough to merge and are heavy (formed with the collapse of stars). The project is analyzing the rest of the O1 data, completing the full suite of searches for various gravitational wave signals, and preparing for the O2 run starting this summer; the Virgo instrument (Italian) is expected to join at the end of this year during the O2 run.

The remainder of the meeting was dedicated to a discussion of the Committee's annual report due 15 March 2016. The report will contain a set of findings and recommendations.

MEETING ADJOURNED AT 4:00 PM EST, 25 February 2016