

<p>Minutes of the Meeting of the Astronomy and Astrophysics Advisory Committee 27 February 2018 2018</p>

Members attending:

Dieter Hartmann	Rachel Mandelbaum (Vice Chair)
Buell Jannuzi (Chair)	John O'Meara
Lisa Kaltenegger	Constance Rockosi
Brian Keating	William Smith
Eliza Kempton	Martin White
Shane Larson	

Agency personnel:

Richard Green, NSF-AST	Paul Hertz, NASA
Diana Phan, NSF-AST	Hashima Hasan, NASA
Ralph Gaume, NSF-AST	Bill Latter, NASA
Joseph Pesce, NSF-AST	Wilton Sanders, NASA
Philip Puxley, NSF-AST	Azita Valinia, NASA
Richard Barvainis, NSF-AST	Kathy Turner, DOE
Vladimir Papatashvili, NSF-Polar	Eric Linder, DOE
Jean Cottam-Allen, NSF-PHY	

Others:

Dana Lehr, AURA	Alexandra Witze, <i>Science News</i>
James Lochner, USRA	Karen Byrum, Argonne Nat'l Lab (detailed to DOE HEP)
Jason Kalirai, STScI	Monty Di Biasi, SwRI

MEETING CONVENED 12:00 PM, 27 FEBRUARY 2018

The Chair called the meeting to order.

DOE

Kathy Turner gave an update on DOE activities. The FY19 High Energy Physics (HEP) PBR (\$770M) is guided by priorities set by the Administration, the DOE Office of Science, and the P5 plan. The FY19 PBR reduces near-term science (research and operations) for P5-guided investments (projects) in the mid- and long-term program. All projects continue, some with delays. Research drops below 40% of the program budget to enable executing P5 priority projects and operations support for ongoing experiments are also reduced to make this possible. The Administration does support the overall P5 strategy.

Projects fully supported in FY19 include Muon to Electron Conversion (Mu2e), the High-Luminosity Large Hadron Collider (HL-LHC) accelerator upgrade project, LUX-Zeplin (LZ), and SuperCDMS (Cryogenic Dark Matter Search) –SNOLAB, and DESI. The LSST Camera project received its final funding in FY18. HL-LHC ATLAS and CMS detector upgrade projects are new start MIEs in FY19. The FY19 request for research and operations was adjusted in order to maintain project support. Operations of current experiments in the Cosmic Frontier continue ramp-downs while supporting ramp-ups for P5 projects to carry out pre-operations efforts.

In FY17, HEP received \$825M in the Congressional appropriation, about \$7M above the FY17 PBR. In FY18, the PBR for HEP was \$672.7M; in a Continuing Resolution until March 23. The FY19 PBR is

\$770M; this is challenging due to significant differences in the request, the Congressional mark-ups and the short term CRs.

HEP is pursuing four of the five science drivers from the 2014 P5 strategic plan, study dark energy (LSST, eBOSS, DESI), search for dark matter (SuperCDMS-SNOLAB, LZ, ADMX-G2), study cosmic acceleration through cosmic microwave background (CMB-S4), and study of high-energy cosmic-ray and gamma-ray particles (HAWC, Fermi/GLAST, AMS). All the experiments and projects have international partners or contributions and some also have private contributions. HEP is laying the ground work for the future by planning and investigating directions in P5 science areas.

HEP is maintaining the core of the DOE Science Mission and is that is reflected in the FY18 current plan and the FY19 Request. HEP is looking forward to participation in the National Academies 2020 Astronomy and Astrophysics Decadal Survey.

Michael Salamon is retiring from DOE and Karen Byrum from Argonne National Laboratory is joining DOE on a detail to HEP.

Buell Januzzi noted that the final funding for the LSST camera is in FY18 but the work will continue into FY19. He asked what work will be going on before the start of operations, is it handled by the labs? Kathy Turner replied that that way it happens at DOE is that the camera is being built by DOE and the project part of the effort is completed when the camera is completed which is in FY20. DOE is currently ramping up support of the integration, testing, and commissioning (ITC) phase; this will be a smooth transition with the project ramp down. There will be a review this summer of the commissioning phase for the camera to make sure it is on track. All of the funding is part of Kathy's budget.

Constance Rockosi asked if there was going to be change to the budgets of the operating experiments to make everything fit within the expected budget. Kathy Turner replied that DOE is looking at the operating budgets of all of the experiments to see how they fit into the overall priorities and they could be squeezed somewhat; there are some ramp downs already planned within the portfolio. This is one of the reasons, HEP is conducting a portfolio review.

Brian Keating asked what the prospects were for CMB-S4 moving forward in the next year. Kathy Turner explained that in the FY19 PBR, there is no CMB-S4 project start. DOE will not be starting the project at that time (not expecting to be somewhere between CD1 and CD2). However, that does not mean that there is no R&D funds that can be used towards CMB.

NASA

Paul Hertz provided an update on NASA activities. The FY19 Science Mission Directorate budget highlights include advancing the national science and exploration goals of executing a new lunar discovery program building on an extensive past lunar exploration and science experience, and studying concepts for a Mars Sample Return while leveraging international and commercial partnerships; safeguarding and improving life through execution of a planetary defense program for NEO detection and mitigation, providing additional funding for space weather research, executing a robust earth Science program consistent with the 2017 Decadal Survey, and supporting interagency partners to achieve missions and leverage data obtained from partners; and, executing a balanced and integrated science programs informed by the decadal surveys, support for the Europa Clipper mission, terminating WFIRST and re-directing WFIRST funding towards completed astrophysics missions and research, continued leveraging innovation and partnerships including SmallSats/CubeSats, and investing in innovative early-stage research and technology. The FY19 Science budget of \$5,895M is ~2% above the FY17 appropriated level (\$5,762.2M).

The Astrophysics Division will continue to build, launch, and operate strategic and completed space observatories, many with international partners, develop technologies to enable future observatories, conduct and sponsor cutting-edge research, mission enabling studies, technology demonstrations, and workforce development.

Major recent accomplishments for FY17-18 have been the Trappist-1 red dwarf star by Spitzer, two mission launches to the ISS (NICER and CREAM), the release of the final Kepler catalog, the gravitational waves and light detected from the merging of two neutron stars, the WFIRST independent review, JWST payload cryotesting and sunshield integration on track for a 2019 launch, and TESS on track for April 2018 launch.

The Astrophysics budget has changed for FY19. JWST has been included as a project within the Astrophysics budget, and remains on track and within budget for 2019 launch. Given its significant cost within a proposed lower budget for Astrophysics and competing priorities within NASA, WFIRST was terminated with remaining WFIRST funding redirected towards competed astrophysics missions and research. The Euclid budget was increased to recover from a failed sensor electronics design. XARM began within the Explorers program and Spitzer operations were extended until JWST is operational, consistent with 2016 Senior Review. TESS, IXPE, and GUSTO remain on track and within budget, all 11 operating missions continue, and the next Senior Review in 2019. The CubeSat initiative and four balloon campaigns remain part of a healthy research program.

Given its significant cost within a proposed lower budget for Astrophysics and competing priorities within NASA, WFIRST was terminated with the remaining funding redirected toward competed missions and research. Funds appropriated in FY18 for WFIRST will allow the project to enter Phase B. Astrophysics is not changing its plans for FY18 for WFIRST; under the CR, there is funding to continue as planned on WFIRST and the FY18 Request that is before Congress is consistent with full support of WFIRST through FY18. WFIRST is undergoing this week a system requirements review and mission design review which is the gateway review to get approval to enter Phase B; a review before the NASA Administrator is planned for April 11 and if passed, WFIRST will enter Phase B at that time.

Buell Januzzi noted per Paul Hertz's explanation of WFIRST that the funding for WFIRST for FY19 is redirected to other efforts. He asked what funding was Paul referring to in his explanation. Paul replied that if one looks at last year's budget and the notional FY19 budget proposal, the Astrophysics top line has remained flat; Astrophysics was planning on spending \$300M on WFIRST in FY19 but the top line has been reduced by ~\$170M so there is additional funding in FY19 that has not yet been reprogrammed. If Congress appropriates FY19 at the lower level without WFIRST that funding in FY19 would be available for other priorities, ~\$50M-\$130M.

Planning accomplishments for FY18-19 include the launch of TESS in April, the start of the WFIRST Phase B, PDR for IXPE, downselects for the next MIDeX and MO missions, the beginning of the Decadal Survey in January 2019, the launch of JWST in 2019, the Senior Review in spring 2019, and if Congress approves the PBR to terminate WFIRST, funds being available for a probe-class mission AO in FY19.

Dieter Hartmann noted that the probe-class missions would only be completed if the funding for WFIRST is terminated. He asked if this was correct and Paul Hertz replied, Yes. Paul noted that for the last few years, Congress has appropriated more for WFIRST than the President's budget and there has been language in the authorization and appropriation bills supporting WFIRST and the science it does and its priority in the last decadal survey. In the Congressional mark ups for the FY18 budget, there was either full or more funding for WFIRST and language instructing NASA to continue work on WFIRST. It is

now an open question whether Congress will accept the Administration's proposal to terminate WFIRST. NASA is not planning any probe AO until Congress signals their intent on how they will treat the budget proposal.

John O'Meara asked whether the President's budget influence the statement of work for the decadal survey. Paul replied that the PBR had no influence. The statement of work will have language that says the agencies will provide a projection of what they think their budgets will be over the decade so the decadal survey can work with it. There will not be numbers in the SOW but the agencies will provide a good planning budget at the time of the start of the survey.

NSF

Richard Green noted that when the NSF budget was publically released, the request for MPS showed a ~30% reduction and had no details on that; there was an addendum that restored NSF's top number to its FY17 value. NSF is in the final stages of interacting with OMB on the budget that fleshes out the details of the flat budget and until that happens and the numbers are released, there is not more Richard can say about the FY19 budget.

Gemini is coming up to its Assessment Point in November and the funding agencies must decide if they will stay in the partnership beyond 2021. What AST is hearing from Congress in funding science is that they are interested in US competitiveness, i.e., the synergy between the ground based assets that AST supports and other astronomical assets (NASA's flight missions and DOE's co-funded facilities). NSF is emphasizing its "Big Ideas" and there are three that are relevant, one of which is "Windows on the Universe," and is being called multi-messenger astrophysics. That emphasis will probably receive preferential funding and how the Gemini telescopes fit into the overall program of gravitational waves and particles and their role in the overall context of assets in the community needs to be explored. AST would like to learn what broader scientific interests are in using the Gemini telescopes over the next decade. It is a decadal survey activity to some degree but because of the timing, AST needs this information on the timescale of 6 months to a year.

Buell Januzzi asked when the Assessment Point was and Richard replied that it was in November 2018. There will be discussions starting starting in early 2019 about the expectations of what the Observatory would do. It has a strategic vision and are working on a strategic plan but the community could indicate what their interests are in using Gemini over the next decade. Buell asked whether the AAAC should take this on or form a subcommittee to look at this issue and Richard indicated that a subcommittee would be the way to do this. If the subcommittee could present some preliminary findings by the September AAAC meeting then a brief final report would be fine for the February meeting. Buell indicated that the AAAC would discuss this later in the meeting and Richard indicated that a more detailed charge would be given to the AAAC.

The Committee spent the remainder of the session discussing the contents of the annual report and the individual write ups.

MEETING ADJOURNED AT 1:35 PM, 27 FEBRUARY 2018