

**Minutes of the Meeting of the
Astronomy and Astrophysics Advisory Committee
28 March 201
Teleconference**

Members attending:

John O’Meara (Chair)	Eliza Kempton
Ian Dell’Antonio	Shane Larson
Andrew Connelly	Mansi Kasliwal
Scott Dodelson	Petrus Martens
Dieter Hartmann	Constance Rockosi

Agency personnel:

Richard Green, NSF-AST	Vyacheslav Lukin, NSF-PHY
Diana Phan, NSF-AST	Reba Bandyopadhyay, NSF-NSB
Ralph Gaume, NSF-AST	Daniel Evans, NASA
Christopher Davis, NSF-AST	Hashima Hasan, NASA
Elizabeth Pentecost, NSF-AST	Kathy Turner, DOE
Renee Adonteng, NSF-AST	

Others:

James Lochner, USRA	Rachel O’Connor
Jeff Foust, <i>Space News</i>	Sarah Lipsy
Rachel Osten, STScI	

MEETING CONVENED 12:00 PM, 28 MARCH 2019

The Chair and Richard Green called the meeting to order.

NASA

Daniel Evans (on behalf of Paul Hertz) provided an update on NASA activities. The FY2020 Science Mission Directorate budget highlights include advancing the national science and exploration goals; executing a lunar discovery and exploration program that leverages commercial partnerships; enabling a Mars Sample Return mission; and preparing for the launch of JWST. Maintaining a balanced and integrated science program involves executing programs consistent with the National Academies Decadal Surveys, continuing to leverage international and commercial partnerships, supporting missions such as Europa Clipper, and executing a robust and innovative Earth science portfolio. Preparing future leaders means achieving excellence both external to and from within NASA, attracting and retaining talent by promoting a culture that actively encourages diversity and inclusion, supporting early career scientists, and engaging the general public in NASA science.

The FY2020 President’s Budget Request for Astrophysics (including JWST) was released on March 11, with additional details released on March 18. The budget requested a decreased level of funding for NASA Astrophysics. The total funding requested for FY2020 is ~\$1.197B, a decrease of \$187M (14%) from the FY2018 appropriation and a decrease of \$299M (20%) from the FY2019 appropriation. The FY2020 PBR accommodates the JWST replan, supports formulation of a potential probe mission as early as 2022 (conditional on Decadal Survey recommendations; earliest formulation of a probe mission is deferred relative to the FY19 budget request to fund the JWST replan), maintains the decadal cadence of four Announcements of Opportunity (AOs) per decade for the Astrophysics Explorers and Missions of Opportunity programs, funds SOFIA for three years beyond its prime mission, extends operating missions

at reduced budgets beyond FY2020, supports mission concept studies and technology investments, and provides no funding for WFIRST.

There has been a 26% increase in R&A funding support since the Decadal Survey (FY2010-FY2018) and it is projected to increase by 33% over the next six years (FY2019-FY2024).

JWST will complete environmental testing of the spacecraft/sunshield element and begin observatory integration in September 2019 followed by observatory testing in August 2020; JWST will be shipped to the launch site arriving in September 2020. WFIRST will complete its element preliminary design reviews by September 2019. NASA will release its next SMEX and Mission of Opportunity AO in April 2019 and will select the proposals for Phase A studies in May 2020. The Astrophysics Senior Review will be completed in June 2019 and independent reviews of SOFIA will be completed in May 2019. Several missions will have their critical design reviews this summer (IXPE and GUSTO), the Resolve instrument on XRISM will be delivered to JAXA in October, and Euclid will deliver the final NASA flight hardware to ESA in October. Finally, Spitzer will complete its mission and be decommissioned in January 2020.

Funding for Astrophysics outside of JWST and WFIRST is projected to increase in the out years. The principal reason for this is to sustain the cadence of four Explorer AOs per decade and to increase the R&A program.

John O'Meara asked about the shift to the right in 2022 of the Probes formulation. Dan Evans explained that WFIRST was proposed for termination in the FY2019 PBR; much of those funds left the Astrophysics budget leaving behind a competed Probes plan. Congress did provide funds for WFIRST in FY2019. In order to accommodate the JWST overrun, the Probes funds for FY2020/21 was taken to solve the overrun issue; a competed Probes line would be no earlier than 2022 but would be dependent on the outcome of the Decadal Survey. This would allow the Decadal Survey to comment on the importance of a Probe line as part of a balanced Astrophysics portfolio. As in the past decadal, NASA will be heavily investing in technology and the out year budgets are a critical factor in the scope and balance of future large missions, Explorers, and Probes.

Andrew Connolly asked about the timeline for the Senior Review and NASA's responses to the recommendations. Dan Evans replied that the proposals were received on March 15 and NASA is running three panels between the end of April and mid-May. In June the high-level Senior Review subcommittee will meet to merge the findings of the panels and they will report to the Astrophysics Advisory Council at a date to be determined (~mid-June). The community will probably get feedback around mid-June, then the APAC will choose to send the reports to Paul Hertz and NASA will issue directions to the missions a few weeks after that.

NSF

Richard Green gave an update on AST activities. He indicated that DKIST construction is on schedule and within budget contingency. This month images have been taken using the M1 and M2 final optics as part of the nighttime optics commissioning. The challenges to the project include the completion and delivery of the instrument suite as well as the data policy.

To put the FY2020 PBR in perspective, Dr. Green explained that FY2018 was a very good year for AST. AST's final total allocation was \$307M, compared to the FY2017 actuals of \$252M. Much of the increase went to one-time specific projects such as multi-messenger astrophysics grants, major upgrades to Gemini-North's adaptive optics system, forward funding DKIST operations for timely completion of the data center as well as a supplement for level-2 data products, and forward funding LSST operations.

The grants program for FY2018 was ~\$50M with a success rate of ~22%; this is consistent with what NSF has been achieving. The number of proposals has remained constant over the past few years at ~1,000.

NSF's FY2019 enacted appropriation increased the R&RA budget by 3%, which allowed for the Antarctic infrastructure funding to be re-incorporated into the MREFC line and for funding of DKIST and LSST at their requested levels. The NSF directorates and divisional allocations are currently being completed internally, with iterations with OMB and approval by Congress expected within 30 days of submission.

The FY2020 PBR has just been released. The FY2020 budget request is \$217M, a 30% reduction over the FY2018 actuals. The grants program is down well below the ~\$50M (FY2018) and is around \$43M, a significant decrease of ~30%. This is partly a programmatic choice to do with how to cope with a decrease in facilities funding. Such a decrease would immediately prompt those facilities to reduce staff, a situation that would be difficult to reverse.

The outcome of the appropriations process for the last two years has been an increase in NSF's R&RA budget relative to the PBR. Should no change be made to projected facilities support and should LSST operations be added in full, then the remaining grants program would be only 6% of the Division budget in 2024 in a flat funding scenario. The consistent advice from the AAAC is a balance between grants and facilities.

Shane Larson asked if it was possible to shrink a facility's budget. Richard Green replied that even though he could not speak for a specific facility, given his experience running facilities, it would be on a case-by-case basis because each facility has a mix of sites they operate, a different set of labor conditions, etc. This would be a challenging choice from a scientific point of view; there would be a loss of scientific capability even if the facility were cut marginally, and that would require real engagement of the community. Ralph Gaume added a relevant comment to Larson's question: The congressional comments and language which were included in the FY2019 appropriation (which are public) stated that AST had to continue to fund its facilities in FY2019 at the same levels as FY2018. Larson further commented that the community may need to start thinking about a strategy to deal with decreasing budgets in order to keep the balance between grants and facilities.

Dieter Hartmann asked why there is an increase in ALMA operations funding. Richard replied that if AST were to retain constant level of effort in Chile, there are certain things that are driving costs there that are not necessarily seen in the US, such as labor costs, energy costs that grow at a high rate, etc.

DOE

Kathy Turner gave an update on DOE activities. DOE was funded for FY2019 in September 2018 when the President signed into law a bipartisan minibus spending package. The FY2019 High Energy Physics (HEP) budget provided \$980M that included funding for LSST, LHC, DESI, and LZ. On March 11, the FY2020 PBR was released. The \$768M for HEP is \$212M below the FY2019 enacted budget. Funding for the Cosmic Frontier, which supports many of the astrophysics programs, is ~\$57.47M, a decrease of ~\$43.57M from the enacted FY2019 budget of \$101.04M. The budget supports the LSST camera, DESI, Super CDMS-SNOLAB, and LZ. The FY2019 enacted budget is the planned amount for the whole year. The Cosmic Frontier's currently approved spend plan is less; this program will have to compete with other Frontiers for some of the funds (primarily Research; for Early Career, etc.).

Several projects have been completed, including eBOSS and the Dark energy Survey (DES). Integration and Testing (I&T) of the raft tower modules for the LSST camera will begin in the second quarter of

2019. The commissioning telescope for DESI has been installed on the Mayall telescope and testing has commenced; on sky testing will begin next week.

HEP continues the planning for CMB-S4 with NSF (AST, OPP, PHY). CMB-S4 will be the next flagship project for the Cosmic Frontier.

Andrew Connolly asked about the FY2019 enacted budget for research, which was a few million more than has been authorized to spend; does this change over the year? Kathy Turner replied that all of the Frontiers have some funds that are in the HEP budget but the program manager does not have access to these funds at this point; some of the funds are for SBIR, early career programs, regular grants programs, etc.

Further Discussion

Ian Dell'Antonio commented that given the FY2020 PBR, none of the plans for the Agency programs discussed last year are doable. John O'Meara concurred; AAAC will probably comment on this in their report. The AAAC could also point out the impact of reduced funding on these projects in the report. Ralph Gaume commented that AST has cooperative agreements with managing organizations and if there was reduced funding for the facilities, AST would work with the managing organizations on how the reduced funding could be mitigated with minimal impact to the science. Since Congress has over the last few years provided more funding than was in the President's budget request, AST has hesitated to significantly cut facilities budgets, to avoid the discussion about taking action with the awardee until AST has its final appropriation; it could be a mixture of personnel cuts or efficiencies within the facility.

Report Preparation

The Committee spent the remainder of the session discussing the contents of the annual report and the individual write-ups. The Chair sent an email to the three Agencies and Congress informing them that the annual report would be delivered no later than April 26. The delay was due to the government shutdown and the the postponement of the AAAC's January meeting to late February. The Chair would like to have drafts ready within two weeks, i.e., April 12, so that the draft can be sent to the Agencies for fact-checking.

MEETING ADJOURNED AT 1:50 PM, 28 MARCH 2019