Meeting Minutes of the
Astronomy and Astrophysics Advisory Committee
26-27 January 2021

Members Attending:

John O'Meara (Chair)
Kyle Dawson (Deputy)
Ian Dell'Antonio
Scott Dodelson
Eliza Kempton
Andrew Connolly
Mansi Kasliwal
Stephan Meyer
Petrus Martens
Alexie Leauthaud
Deirdre Shoemaker
Nancy Chanover
Priyamvada Natarajan

Agency personnel:

Ralph Gaume, NST-AST
Alison Peck, NSF-AST
Christopher Davis, NSF-AST
Renee Adonteng, NSF-AST
Elizabeth Pentecost, NSF-AST
Glen Langston, NSF-AST
Joseph Pesce, NSF-AST
James Neff, NSF-AST
Donna O'Malley, NSF-AST
James Higdon, NSF-AST
Hans Krimm, NSF-AST
Carrie Black, NSF-AST
David Boboltz, NSF-AST
Sarah Higdon, NSF-AST
Edward Ajhar, NSF-AST
Luke Sollitt, NSF-AST
Marcus Seigar, NSF-AST
Harshal Gupta, NSF-AST
Nigel Sharp, NSF-AST
Jonathan Williams, NSF-AST
Ashley Zauderer, NSF-AST
Allison Farrow, NSF-AST
Martin Still, NSF-AST
Sean Jones, NSF-MPS
Swati Sureka, NSF-MPS
Karen Pearce, NSF-OLPA
Randy Phelps, NSF-OIA
Denise Caldwell, NSF-PHY
Slava Lukin, NSF-PHY
Darren Grant, NSF-PHY
Saul Gonzalez, NSF-PHY
R. Chris Smith, NSF-MPS
James Whitmore, NSF-PHY
Jean Cottam Allen, NSF-PHY
Michelle McCrackin, NSF-NSB
Brad Gutierrez, NSF-NSB
Elise Lipkowitz, NSF-NSB
Caroline Blanco, NSF-OGC
Robert Moore, NSF-GEO
Paul Hertz, NASA
Eric Smith, NASA
Hashima Hasan, NASA
Farisa Morales, NASA
Azita Valinia, NASA
Francesco Bordi, NASA
John Callas, NASA
Jeffrey Hayes, NASA
Kelly Fast, NASA
Nicola Fox, NASA
Terence Doiron, NASA
Ira Thorpe, NASA
Stephen Rinehart, NASA
Peg, Luce, NASA
Stefan Immler, NASA
Mario Perez, NASA
Brian Williams, NASA
Lorella Angelini, NASA
Kartik Sheth, NASA
Linda Sparke, NASA
Lucas Paganini, NASA
Karl Stapelfeldt, NASA
Julie McEnery, NASA
Rob Landis, NASA
Bernard Kelly, NASA
Daniel Evans, NASA
Hannah Jang-Condell, NASA
Evan Scannapieco, NASA
Kathy Turner, DOE
Mark Matsumura, OSTP
Andrew R. Baden, DOE

Others:

David Goodman, Caltech
Mike Bartsch, Caltech
Natalie Roe, Berkeley Lab
David Traore, Orbit, Inc.
Dominic Benford, WFIRST
Jim Murday, USC
Andrew Seymour, WVU
Tricia Crumley
Phil Puxley, AURA
Steven Kahn, AURA
Patrick McCarthy, AURA
Joel Parriott, AAS
Kelsie Krafton, AAS
Vern Pankonin, IAU
Rachel Osten, AURA
Ashton Lum, Lewis-Burke
Ben Kallen, Lewis-Burke
Jeremy Weirich, AURA
Mabel Wong
Darren Grant, MSU
Pamela Green
Michael Levi, DESI
Monty Di Biasi
Patrick Taylor, USRA
Edgard Rivera-Valentín, USRA
Doug Swartz, USRA
Alan Tokunaga, U Hawaii
Jeff Foust, SpaceNews
Eric Linder, LBNL
Jeff Zivick, U Chicago
Fengchuan Liu, TMT
Kerry Dolan Slater, TMT
Gregory Mack, NAS
Lee Curtis
Robert Minchin, Arecibo
Flaviane Venditti, Arecibo
Abigail Sheffer, NAS
Jim Lancaster, NAS
Jay Elias, NOAO
Avital Bar-Shalom, OMB
Greg Tucker, Brown U
Richard Rogers, Stellar Solutions
Alexandra Witze, Science News
Luisa Fernanda Zambrano-Marin, Arecibo
Ashlee Wilkins, House of Representatives: Science, Space, and Technology Committee
Keith Angelo Johnstone, House of Representatives: Science, Space, and Technology Committee
Catherine Pilachowski, Indiana U Bloomington
Irene Klotz, Aviation Week/Space Tech
Sidney Wolff, NOAO
Maxime Devogele, Arecibo

MEETING CONVENED AT 10:00 AM, 26 JANUARY 2021

GENERAL

The Chair called the meeting to order. Introductions were made by Ralph Gaume.

Ralph Gaume introduced Dr. Sean Jones, the Assistant Director of Mathematical and Physical Science.

Martin Still reviewed the rules, membership, and duties of the AAAC. He indicated that the September meeting minutes will be delivered for approval prior to the next meeting. He reminded the Committee to complete the poll for the selection of the June (and September) meeting dates.

John O'Meara announced that his tenure as the Chief Scientist at Keck Observatory and the Chair of the AAAC are coming to an end this fiscal year. He further informed the Committee that the annual report is due March 15 and will be discussed later in the meeting.

Dr. Sean Jones introduced himself and welcomed members, partners, and staff of the AAAC.

- He reiterated that the AAAC's mission is to make recommendations on the coordination of astronomy and astrophysics activities between NSF, NASA, and DOE, and to provide recommendations on general astronomy issues to the three agencies. He is looking forward to hearing about those opportunities for coordination and collaboration.
- The Decadal Survey leadership team at NSF is fully engaged on the new facilities being considered.
- The NSF will not be closing Arecibo Observatory and will continue to support a partnership in Puerto Rico.
- The Biden Administration has elevated the Office of Science and Technology Policy to a Cabinet-level position. They have adopted four pillars in their science activities: economic recovery, racial equity, climate research, and COVID-19. The NSF will strive to make significant impacts on all these areas including responding to community needs as a result of the pandemic.
- Dr. Sethuraman Panchanathan was appointed as the new NSF Director in 2020.
- Ralph Gaume will be retiring this calendar year; a date has yet to be confirmed.

John O'Meara asked whether Sean had any advice for the Committee on how they should respond to any issues regarding the MREFC account. Sean responded that Ralph has made suggestions about the MREFC process and the concern is there needs to be some limit on what is being spent. Feedback will be required from the community regarding the impact upon advancing science in the future. He further stated that Ralph will talk about the topic more and expressed his opinion that MREFC impact on science and the future of astronomy and physics is very useful information for the community.

DOE/HEP Programs and Budget Update – Kathy Turner

Kathy Turner introduced several team members including Karen Byrum (Detailee), Drew Baden (IPA from University of Maryland), and Eric Linder (IPA whose tenure has ended and is now back at Berkeley full-time). Kathy gave a brief update and review of the Dark Energy Spectroscopic Instrument (DESI) as well as other efforts for the Rubin Observatory. She pointed out that HEP's primary guidance and community input is received from FACA panels such as the joint DOE and NSF High Energy Physics Advisory Panel. The program plan is laid out by following the National Academies studies, other community studies, as well as the continuation of the 2014 P-5 Strategic Plan.

The FY21 appropriation came at the end of December. The Office of Science's budget is around $7.0 billion, up 0.4% from FY20. HEP has increased its budget by $1M from $1.045 billion to $1.046 billion. Overall, it is noted that the budget has strong support for Quantum Information Science and Artificial Intelligence Research, which are two new and rapidly growing areas in the program.

A major project in the HEP program is the Long Baseline Neutrino Facility (LBNF) with the DUNE detector; construction funding is flat for this FY. The CMB-S4 project budget directive is to provide not less than $6.0 million for the project, of which $1M is equipment funding. Congress has directed $12.0 million for DESI operations, $6.0 million for LZ (dark matter) operations, and $18.5 million for Rubin

Observatory. The Cosmic Frontier Funding in FY21 for research is down compared to FY19/20; this supports scientists at the Universities and Laboratories. Future R&D will support the Dark Matter New Initiatives. For Experimental and Facility Operationsthere was an increase in funding compared to FY20. The operations costs of experiments will ramp up to $55-$60 million in the next couple of years but will level off to around $40 million by 2030.

Public Data Release 2 of year 1 to year 6 DES data was rolled out at the AAS meeting. DESI is now taking data, starting a few weeks ago. The DOE project is led by the Lawrence Berkeley Lab; the instrument is mounted on the Mayall telescope on Kitt Peak. The project was completed (including the commissioning) in mid-March 2020 but had to move into safe storage due to Covid. It was recommissioned starting in September.

DOE's role on the Rubin Observatory construction project is fabrication and commissioning of the camera. Due to Covid-19 delays, the camera project fabrication has been restructured to complete at the subsystem level in May. The only remaining scope on the camera project is the filter completion which is expected to be completed within a few months. The full camera is expected to ship to Chile in February 2022 and be ready for installation in July 2022.

DOE and NSF have agreed to split Rubin operations 50/50. In the coming year, the operations planning team will prepare for the submission of in-kind contributions to the project. There is a contribution evaluation committee that will carry out these assessments and make recommendations to DOE and NSF for their approval by the end of the year.

Berkeley Laboratory was chosen in August 2020 as the lead laboratory for the CMB-S4 project and will manage the HEP's roles and responsibilities. The DOE is partnering with NASA on the Large Area Telescope on the Fermi mission Instrument Science Operations Center at SLAC. The DOE has been supporting the scientific collaboration and operation of the Alpha Magnetic Spectrometer (AMS) on the International Space Station. NSF and the DOE carry out operations for the High-Altitude Water Cherenkov (HAWC) Detector in Mexico; HEP operations support for HAWC finished at the end of 2020 after providing over 5 years of support.

A DOE-NASA RFI was released on January 20 to gather information from the community in areas aligned with the science goals of both program offices, including scientific and technology benefits and obstacles, how the capabilities, infrastructure and resources of each agency could be used, and other pertinent information. The information received will inform DOE and NASA regarding the potential development of mutually beneficial partnerships and collaborative activities. The three focus areas for the RfI are: (1)) telescopes or sensors on the moon's radio-quiet far side to explore the early years of the universe; (2) probes to carry out experiments of fundamental physics in the microgravity environment of the space station; and (3) enhancement or extension of the dark energy science reach of data that will be delivered by the Rubin Observatory, Euclid, and the Roman mission. Formal responses to the RFI are due March 8.

John O'Meara asked Kathy when the handover of the interim data facility with Google and the U.S. data facility is expected to happen and is this after commissioning is done. Kathy responded that NCSA is carrying out the efforts during the construction phase (which includes commissioning) and there will be an overlap with that and planning for the IDF and USDF. Steve Kahn (Rubin Project Director) stated that during the construction project, the commissioning will use the data facility at the National Center for Supercomputing Applications (NCSA) at the University of Illinois. The interim data facility at Google is

to partly enable the operations team that is working in parallel to develop capability and readiness for operations once commissioning has started. The US Data Facility at SLAC will take over during operations. Data facilities will be running in parallel at some level but with different interfaces to meet different purposes; there is not a lot of redundancy.

Alexie Leauthaud asked Kathy to explain more about the process regarding the DOE and NASA RFI and what are the potentially collaborative areas. Kathy responded that it is a part of a larger structure where DOE and NASA are looking at different areas where they can partner to enhance science and other areas. Paul Hertz added that there is an overarching MOU between DOE and NASA.

Deidre Shoemaker asked Kathy to explain more about the DOE and NSF's and NAS particle physics decadal survey and any impacts due to COVID-19. Kathy responded that this study was planned to start in 2020, which was delayed, so it is now starting in 2021; these NAS studies usually take about two years.

Priya Natarajan asked Kathy to provide more detail on what measures the Agencies are taking for early career researchers during COVID-19. Kathy responded that there are no formal processes or additional funds available in the Office of Science, but they have contacted the PIs and are allowing flexibility to complete the scope of work.

Update on NASA Heliophysics – Nicola Fox

Nicola Fox gave a quick overview of Heliophysics Division activities.

Heliophysics recently launched ICON in October 2019 and Solar Orbiter in February 2020 before COVID hit. The impact that the mission teams are seeing is related to some inefficiencies and telework staff reductions. The project teams are tracking all impacts should a delay occur.

The team will continue to seek community input on potential partnerships at the Science Mission Directorate (SMD) level. The *"Science 2020-2024: Vision for Scientific Excellence"* science plan is available for viewing on the Heliophysics Division's web site. The team has received the mid-term assessment from the NAS who assessed progress towards the implementation of the 2013 Decadal survey. The Division is looking to partner with other agencies to continue scientific discovery and application of new capabilities including artificial intelligence, machine learning, and other areas.

Heliophysics has successfully launched five missions including GOLD (Global Scale Observations of the Limb and Disk), SET (Space Environmental Testbed, Parker Solar Probe, ICON (Ionospheric Connection Explorer), and Solar Orbiter. There are an additional 12 missions in formulation/development and another seven under study which represents the largest increase in missions in the history of the Division. Solar Orbiter was launched on February 9, 202 and the first data were released to the public in September.

John asked Nicola to explain to the Committee the importance of a KDP-C. Nicola responded that a KDP-C is essentially the competitive confirmation review for a mission in development.

Selected Explorer Missions of Opportunity (EZIE and EUVST) were announced in December. The GDC team is getting ready to put out an instrument call for cost-effective, resource-efficient instruments and there is an emphasis on constellations. The Heliophysics Division will be putting out a call for interdisciplinary scientists to work with the instrument teams in phases.

Heliophysics is currently considering an enhancement of the "Living With a Star" program. Heliophysics is also working closely with NOAA to jointly lead a framework initiative that includes studies of satellite drag. Heliophysics is working with ESA on a potential contribution to the L5 Mission.

John O'Meara asked Nicola if she can inform the Committee about the size of the budget for Heliophysics. Nicola responded that this year the Heliophysics Division has received its highest appropriation of around $750 million.

Petrus Martens asked Nicola about the replacement of the PI model for a partner mission. Nicola responded that teams could put out a dedicated call for instrument contributions for solar orbiters, etc.

John asked Nicola if she could give a sense of scale regarding the CubeSat size typically deployed on rideshares. Nicola responded that it is something that the team is looking at; there could be an ESPA ring with a small spacecraft. John also asked whether most of the effort for SMD-wide policies are centered on uniform standards across divisions. Nicola responded that most of the policies are at the SMD level and are more concerned with R&A outreach programs.

Nancy Chanover noted that there has been a new initiative undertaken in the Planetary Science Division to bring in young investigators as ex-officio science team members to diversify the institutions that have people involved in missions and get them in at an earlier career stage to expose them to the whole process. She asked whether that was something that Heliophysics was considering; Nicola responded yes.

NSF/AST Programs and Budget Update – Ralph Gaume

Ralph Gaume presented an update on activities at NSF since September 2020.

The Nobel Prize in Physics was awarded to Roger Penrose, Reinhard Genzel and Andrea Ghez. It was noted that Roger Penrose received six (6) DMS & 11 PHY awards between 1984-2008; Reinhard Genzel received 8 AST awards between 1982-1987, and Andrea Ghez received 10 awards between 1994-2019. If the community is interested in hearing more about the NSF, there is an hour-long interview with a local station, Fed News Radio, between Andrea Ghez and Glen Langston (AST).

The Daniel K. Inouye Solar Telescope is one of the MREFC programs. The construction had been halted due to COVID-19 but continued in July 2020. The NSF Acting Director authorized $9.4 million in Management Reserve to cover COVID delays. The start of operations is set for May 2021 but is expected to slip because of COVID restrictions. DKIST issued a press release last year of the highest resolution image of a sunspot ever recorded; a diffraction-limited image taken earlier last year with the context imager and released in conjunction with an overview journal paper.

The ramp-up of construction activity for the Rubin Observatory began on the summit. It was noted that there will be a one-year delay due to COVID; the Rubin Observatory survey was originally scheduled to start at the beginning of FY23. The interim data facility is beginning its pre-operations in the Google Cloud. The data facility management will be led by SLAC in coordination with AURA. The telescope dome is now substantially closed.

The National Solar Observatory is preparing for the commissioning and operations phases of DKIST. The first rounds of proposals have been received and evaluated. NSO also operates the Global Oscillation Network Group which is important for predicting space weather.

Kitt Peak and the Cerro Tololo Observatories have been operating since September 2020. The Mayall is housing DESI and is starting the five-year Dark Energy Spectroscopic Survey. The Blanco 4m on Cerro Tololo has released the final data set for the Dark Energy Survey (DES). Gemini-North has been conducting nighttime observations since last May. Gemini-South returned to science observations towards the end of October. The Gemini Offices in Hilo and La Serena are operating mostly under telework.

Science operations at Green Bank Observatory continued with COVID protocols in place and 50% staffing; the on-site workshops are closed, and meetings are now rescheduled remotely. The VLA has continued its operations uninterrupted; NRAO Management devised COVID-19 safe practices for maintenance and operations, however, the visitor center in New Mexico is closed. The VLBA is operating as usual; in 2020, science operations continued uninterrupted. Hurricane Maria repairs have been completed at St. Croix, and all 10 stations are now connected to Fiber. Science results include a VLBA detection of a radio jet from a radio-loud quasar, 12.8 billion light years away; it is the brightest radio emitting quasar found at that distance. The observation provides observational support for theoretical understanding of why these objects are so rare in the early universe. ALMA was shut down in mid-March; it is not the easiest observatory to bring back online after an extended shutdown, particularly a winter shut down. However, operations will recommence by mid-March; some of the antennas are moving and are taking preliminary data.

Dr. Sean Jones, who was Anne Kinney's Deputy, was acting AD for a while, but was appointed MPS Assistant Director in September 2020. Dr. Anne Kinney left NSF to become NASA/GSFC Deputy Director in May 2020. Dr. Tie Luo was appointed Assistant Director for MPS on January 17, 2021. Dr. Richard Barvainis retired at the end of 2020. Dr. James Higdon and Alison Peck have joined the AST team.

Recruitments are underway for new positions in AST: (1) AST Senior Advisor for Facilities; (2) AST Division Director; (3) three program officer positions for grants and facilities.

The MPS Funding Statistics for FY20 are available online. The funding rate for AST in the last fiscal year was 24%; AST received approximately 850 proposals and made 203 awards.

John O'Meara asked whether the statistics were just for the AST awards or whether it was for all programs; Ralph responded that it related to everything. John further asked if this included the MSIP submission as well as the AST MSRI. Ralph responded that it included everything across all the divisions. Ralph also pointed out that it was much more than just AST services; it was all actions at the division level and awards.

There was a Continuing Resolution though December 27. The enacted NSF appropriation increased R&RA by 2.6% to $6.910 million. The MREFC line fully funds Rubin Observatory at the requested level. The AST/AAG grants program should have a reasonable year. The in-house appropriators for NSF are the Commerce Science and Justice Committees. The Astronomy Division overwhelmingly gets the most language in the NSF Congressional reports. The Omnibus bill reiterated that the Foundation should maintain core research including astronomy facilities at no less than the 2020 funding level.

Mansi Kasliwal asked about the House language on MRI concerning whether the recommendation is to cover some operating costs and what it meant. Ralph responded that the Windows on the Universe implementation group reaches out to the facilities and solicits proposals directly from the facilities, therefore the language indicates that this practice should be continued. Mansi also asked whether there are facilities that the NSF is thinking about divesting. Ralph responded that they were not encouraging divestment and what the language meant was that if the NSF was considering divesting of any facilities, Congress wants to be notified of that in the President's budget.

Nancy Chanover asked what role the academic institutions now play or will play with what has been asked by Congress. Ralph responded that the NSF is not allowed to operate their own facilities. The facilities are operated by awardees.

Ian Dell'Antonio noted that the budget figures did not add up and questioned whether there were small amounts of money that were not included in the budget. Ralph responded yes and further explained that there were small accounts that receive small amounts of money that AST did not include in their graphics. Ian also asked about the increases in staff levels and made mention of the free energy and staffing to respond to the recommendations of the Decadal model survey. Ian asked whether Ralph anticipates having the capability to bring in new staff to respond to whatever the Decadal recommends. Ralph responded yes and further elaborated that a Senior Advisor will be appointed to take on the implementation of the Decadal. Ian also asked if Ralph anticipates bringing on additional staff if the senior advisor is not enough; Ralph responded yes.

John O'Meara asked Ralph to explain what is the success rate for AST MRI awards, what is the success rate of an MSIP, and what is the notional success rate of MSRI; is everything at 24%. Ralph responded that this should be discussed in a closed session, but he will provide the breakdown in an email distributed to members of the committee. John also asked for a budget clarification and Ralph responded that the budget is not just for AST, it is a foundation wide account and suggested that John download the NSF budget. Ralph also pointed out that for the President's budget request for 2020/2021, these are available on the web under facility transition.

Kyle Dawson asked Ralph to clarify whether the MREFC program was supposed to act like a bridge where the cost would eventually transfer back fully to AST for operations as a "stop-gap" for two years. Ralph responded yes.

Maunakea Governance Update – NSF Dave Boboltz, Caroline Blanco, Karen Pearce

John O'Meara declared a conflict of interest being the Chief Scientist of an Observatory that operates on Maunakea and requested that the Vice Chair, Kyle Dawson run the session for the Maunakea Governance Update.

Dave stated that the Governance of Maunakea (MK) is the purview of the University of Hawaii; NSF is a stakeholder in that governance. The presentation is related to the engagement of the future on MK with regards to the TMT. He introduced himself as a Program Director in AST and oversees the Daniel K. Inouye telescope construction project. Caroline Blanco is the Assistant General Counsel at the NSF and oversees environmental matters and litigation at NSF as well as also being the Federal Preservation Officer and Tribal Liaison; she is also involved with DKIST's environmental compliance process. Karen

Pearce is a Senior Legislative Affairs Specialist in the Office of Legislative Affairs. She has been with the NSF since 1998 and has been working on facilities and several environmental compliance processes.

As background, TMT tried to construct in July 2019 and a group of protestors blocked access to the summit. In December 2019, the majority of protestors and law enforcement personnel left, and the situation was deescalated. In early 2020, Governor Ige met with the NSF Director and discussed NSF concerns over existing assets on Maunakea, specifically the Gemini Observatory and VLBA. Meetings were held with the Hawaiian stakeholders and a meeting was held with the Governor on March 27, 2020 to discuss the MK Management working group as part of the future Blue Ribbon Panel. In May 2020, NSF received a Planning and Design Proposal for the US Extremely Large Telescope Program (NOIRLab, TIO, and GMTO). An informal outreach effort was authorized in August 2020 including "Talk-Story" sessions. In October, the NSF outreach team prepared a set of "Frequently Asked Questions" to guide the informal outreach sessions. Additional talks have been held with the Governor and a consultant, Dawn Chang, has performed an independent evaluation of the MK Comprehensive Management Plan; through that process Dawn has been engaging the community. In addition to that process, the University of Hawaii is working on the renewal of the Master Lease which expires in 2033; this will require an Environmental Impact Statement. In conjunction with the renewal of the Master Lease, there is also development of a new master plan for Maunakea that is managed by the University of Hawaii.

Priya asked what role the NSF expects to play in the lease renewal process. Caroline responded that the NSF are stakeholders and will be part of the process. Ralph Gaume (NSF) noted that the outreach and interactions with the Native Hawaiian community and other stakeholders on what is happening on the Big Island with TMT and other issues needs to continue regardless of the TMT status. Others commented that building these relationships is very important for now and into the future.

Dual Anonymous Peer Review within NASA Astrophysics – Dan Evans

Dan Evans provided an update on dual-anonymous peer review at NASA. Following a successful pilot study for the Hubble Space Telescope, the decision was made by SMD to adopt dual-anonymous peer reviews (DAPR) for several programs across the directorate. This change is aimed at addressing structural and systematic bias within the review process. Under the DAPR approach, proposers are unaware of the identity of members of the review panel and as well, reviewers have no explicit knowledge of the identities of the proposing team during the evaluation process.

In studies conducted by Hubble over several years, dual-anonymous peer review was found to have a positive effect on gender parity, specifically, the success rate of investigators whereby a 5% gap was reduced to 1% over the period. The Hubble Space Telescope Dual-Anonymous Peer Review Team has been awarded the 2020 NASA Group Achievement Award for their work in this area.

Dual-anonymous peer review was adopted by the Astrophysics Data Analysis Program in 2020 and early results support the positive impact of DAPR in improving gender parity and mitigating instances of unconscious bias. Dr. Evans noted that gender is just the tip of the iceberg and that there are several additional factors that impact equity and fairness during the review of proposals. For example, the ROSES programs in the SMD pilot revealed varying rates of success depending on the institution type. Proposals from a government contractor or NASA Center had a success rate exceeding 20%, while those

from non-R1/R2 or minority-serving institutions were between 10-15%. The goal of DAPR is to level the playing field for everyone and shift the focus on the proposed science.

Beginning in 2019, all Astrophysics GO/GI programs began the process of permanently converting to dual-anonymous peer review. Based on the success of 2020, additional programs will be converted to dual-anonymous peer review in 2021. A series of workshops, townhalls, and other informational resources have been produced to help educate and guide the proposing community through this change. This includes detailed guidance on issues such as the submission of anonymized proposals, referencing of unpublished work and proprietary results, and institutional access to unique resources, etc.

The DAPR experience has been mostly positive thus far. In over 1000 proposals, there has been only one egregious violation of anonymization guidelines, in which case, the proposal was returned without review. Other minor pitfalls such as claiming ownership of past work, including metadata, mentioning the institution name in the Budget Narrative, etc. has occurred in about 10-15% of the proposals. In such instances, proposers were informed of the violations. The expectation is that such occurrences will steadily decline as the community becomes accustomed to working with dual-anonymous peer review. ~~HGIO~~ (Hubble GO/GI?) DAPR comparative statistics have revealed an uptick in the fraction of awards that go to early-career investigators. A similar increase has also been reflected in the number of proposals received from this demographic group. In reviewer surveys, over 89% of reviewers either agreed or strongly agreed that the dual-anonymous peer review improved the overall quality of the review.

Dan Evans acknowledged that some proposed work may be so specialized that the identities of the Principal Investigator and team members may be readily discernable, despite efforts to anonymize the proposal. In such instances, NASA will not return the proposals without review.

Bernard Kelly questioned whether there is a down select of proposal documents after the first couple of days with anonymous review before seeing the expertise documents. Dan Evans responded that there is no triage; every proposal undergoes a comprehensive scientific assessment, and a ranking is produced. Program Officers have the flexibility to select which of those expertise and resource documents are revealed to the panel, and often come to that determination based on the success rate.

John O'Meara noted his support for NASA's dual-anonymous initiatives but expressed concern regarding the continued reliance on inferred statistics regarding key demographic data. Dan Evans agreed with the concern and noted that there is an initiative at the SMD level to put forward a study that will go the NAS to advise on what demographics data future Decadal surveys will need. Paul Hertz added that this study will also highlight barriers to data collection (such as statutory limits) and recommend relief, which can then be included in legislative requests. He further noted that one initiative being undertaken at the SMD level under the Anti-Racism Action Group focuses on appropriate data collection, which will inform progress on inclusion and diversity, as well as the impact and outcomes of such initiatives. The timeframe for the completion and reporting on the National Academy study is not yet known.

Piet Martins expressed support for the overall objective of the dual-anonymous peer review program and shared his experience as a reviewer on such a panel. He noted that while the identities of individual investigators were not known, given the relatively small size of the community, it was relatively easy to identify the institutions. Further, at the end of the anonymous reviews, grants tended to go to the larger institutions over the smaller ones, despite similar scores. There were also instances where efforts to adhere to anonymization have resulted in proposals failing to mention studies of significance that have been conducted on the subject because it was led by the same investigator. He suggested this is something that will need to be accounted for as these initiatives are further developed. Randy Phelps noted that at NSF, for the MRI program, available funds are separated by proposal pressure from research intensive

universities/non-profits and primarily undergraduate/minority institutions. This results in a comparable success rate for institution types.

Jim Neff noted that NSF has a Merit Review Modernization Task Force that is currently exploring dual-anonymous peer review. Data from the merit review process indicates that there is proportionality among all demographics between the number of proposals submitted relative to the number of awards. The exception to this is gender, where across NSF, women score slightly higher in their success rate than in their proposal rate. Dr. Neff noted that dual-anonymous peer review represents a major change and is not something that can be done overnight at the division level. However, there is ongoing communication across the NSF about this issue and what the process should look like moving forward. Dan Evans stated that the team from NASA has been in contact with various personnel at NSF about this.

Ian Dell'Antonio asked whether there is enough data to ascertain the impact of double anonymous peer review on the demographics of proposers. Dan Evans responded that there has been a slight increase in the number of proposers with inferred female names, as well as an uptick in early-career proposers.

Spectrum Management Update – Jonathan Williams and Ashley Zauderer

Jonathan Williams reported on NSF-wide efforts to find solutions to challenging spectrum management issues, including the identification of solutions that will help achieve protection for astronomy in the coming decade. He noted the rapid increase in demands for electromagnetic spectrum availability. Over the last twelve years, the number of wireless devices has increased tenfold, and today, there are far more wireless devices than people on the planet. The increased demand for more devices poses significant challenges to the community, especially radio astronomy.

The 5G ecosystem presents risks and opportunities for DoD. The challenges that NSF encounters with the spectrum include commercial use, public safety, national security, and science applications. NSF-supported research relies on access to the electromagnetic spectrum and catalyzes its efficient usage. NSF is uniquely positioned to encourage innovation for the productive coexistence of spectrum users. To ensure protection of passive scientific uses, NSF will work closely with counterparts in engineering and computer science so that new applications have protections of passive users in mind from the very beginning of the research and development cycle.

In 2018, a cross-directorate ESM Coordination Group was created with the explicit purpose of enabling an organized approach to spectrum research funding and representation of NSF-funded research spectrum needs in a coherent manner. Further, NSF's Spectrum Innovation Initiative (SII) takes a multidisciplinary approach to spectrum innovation and use and will help to bring all stakeholders to the table early in wireless application development.

It was noted that though NSF telescopes have typically been able to operate successfully due to their remote locations and coordination, the steady increase in emitters from airborne and other devices will require a rethink on continued provision of access to broad portions of the spectrum. National Radio Dynamic Zones (NRDZ) will pilot innovative approaches for transmission and reception at various frequencies of interest, which will eventually lead to a modern machine-to-machine frequency coordination regime. Efforts to raise funding in support of this initiative are underway, as well as ongoing engagement with the community through the Dear Colleague Letter to cultivate ideas. Initial supplements were awarded in fiscal year 2020 including for passive science and astronomy.

Through the Coordination Group, an integrated cross-directorate approach is being implemented to allow NSF to meet its core spectrum goals to innovate and secure, and to consider the needs of all stakeholders, including the stringent needs of the Astronomy community.

John O'Meara questioned whether there are initiatives aimed at extending the spectrum range to include non-radio frequencies. Jonathan Williams responded that currently, the SII primarily deals with radio frequencies, with existing solicitations focused on wireless spectrum research and workforce development, etc. It was noted that non-radio frequencies are on the radar, however. Ashley Zauderer added that the official regulated spectrum does stop at about 275 -300GHZ. And so, while that is a focus, there is a significant push up to 2-3 terahertz and beyond. This presents some opportunities on the periphery for expansion.

No-deadline Proposal Pilot Study at NSF – Jim Neff

Jim Neff provided an overview of the AST No-deadline Proposal Pilot Study noting that years of level budgets and increasing proposal pressure led to historically low success rates which eventually bottomed out in 2014, with 1 in 7 proposals being awarded. At the same time, similar issues were occurring in other agencies, with significant overlap between NASA and NSF proposals. This led to an increased focus on ways to decrease workload while simultaneously increasing success rates. Preliminary results from a pilot study in another field indicated deadlines might increase the total number of proposals submitted. This gained traction within the community and led to increased pressure to experiment with "no-deadline" processes.

AST determined that a process was needed for managing year-round proposals, and in 2016, the AAG and ATI solicitations were modified, and the Solar Planetary Grants (SPG) Pilot was announced as a two-year program with no deadlines. Though there was a decline in the number of proposals in the first year, reviewers noted no change in the quality of the proposals. There was, however, a negative impact on administrative burden and efficiency due to smaller, more frequent panels and increased reliance on ad-hoc reviews. There was also difficulty to fairly and uniformly allocate funds on a year-round basis. The SPG Pilot was phased back into AAG in 2019.

Questions were raised regarding outcomes of "no-deadline" initiatives among other groups. Jim Neff noted that feedback from other similar programs have been fairly similar to the results of the SPG Pilot where program officers noted an increased workload. Despite an increase in administrative burden, some administrators deemed their respective pilots successful based on attained metrics of reduced applications and increased success rates.

Andrew Connolly asked if there were other options being explored to reduce administrative burden. Dr. Neff responded that a variety of options have been examined and added that feedback from the community on addressing this issue is welcomed.

NASA/APD Programs and Budget Update - Paul Hertz

Highlights:

- Recently NASA added a new division to the Science Mission Directorate, the Biological and Physical Science Division. The Division is responsible for all research in fundamental life and microgravity sciences; most of their research is done on the space station.
- In July 2020 NASA launched the Mars 2020 mission with the Perseverance Rover and the Ingenuity Helicopter. Their landing on Mars is scheduled for February 18. A press meeting was held on January 27 to announce all the events leading to the landing on Mars.
- A successful touch and go on an asteroid in October 2020 when the OSIRIS-REx Spacecraft touched down and grabbed its sample. The sample filled the sample container. The capsule is now sealed and in May 2021 OSIRIS-Rex will be leaving the orbit around the new asteroid for a return to earth in 2023.
- The James Webb Space Telescope (JWST) completed its Observatory Level Environmental testing last Fall. The complete observatory in its launch configuration was placed on the vibration table where it was subjected to the vibration environment that it will experience during the launch to ensure that it behaved as designed. It is set to launch in October.
  The Wide Field Infrared Space Telescope (WFIRST) was named the Nancy Grace Roman Space Telescope in May 2020. Dr. Roman was NASA's first chief astronomer who paved the way for NASA's space telescope programs. NASA is continuing the development of the hardware and is making good progress on Roman.
- NASA added Inclusion as a fifth core value in its mission joining Excellence, Teamwork, Integrity, and Safety. These are the core values that lead to mission success at NASA.

NASA continues to increase its funding for the R&A program; for FY21, the $112 million presented in the budget includes continued growth in the research program. In the next few years after the Decadal Survey, NASA will be taking a close look at the planning as they incorporate the highest priorities and the recommendations of the Decadal survey. The last Decadal survey did recommend substantial growth in the research program and NASA has sustained 60% growth over the 17 years. During the pandemic, R&A reviews went virtual. There were no cancellation of solicitations and some delays allowed the PIs more time to submit. NASA has continued to make selections under 150 days; the only place NASA has missed their goal is for the Exoplanet Research Program which is a cross-division program and needs extra time to coordinate across all four divisions.

NASA has begun an Open Science Data Initiative within the Science Mission Directorate. There is a commitment that all publications resulting from awards will be open access. In Astrophysics this requirement is satisfied by the Astrophysics Data System (ADS), but there is also a publication repository where the rest of the science publications are housed. In this Open Science Data Initiative, NASA is making targeted investments in cloud computing, open-source software, AI/ML, data search discovery, etc. There are also a couple of ROSES elements that provide funding to the community to develop open-source tools, etc.

A ROSES solicitation is open right now and the final due date is in March. It will provide augmentations supporting early career and soft money early career researchers. NASA has set aside approximately 15% of the funds that would be used for new awards for FY21. One round of proposals came in and the Mission Directorate has received over 100 requests asking for $13 million. There will be a second tranche of proposals to be received on March 5. NASA is also adjusting the NASA Post-Doctoral Program at the NASA centers in response to the pandemic.

Regarding the Mission program updates, NASA continues with the Artemis program to return humans to the surface of the moon. In the last few months, NASA signed MOUs with partner agencies.

The first NASA Astrophysics CubeSat which was launched almost two and a half years ago re-entered the atmosphere on January 4; the mission was scientifically successful. The experiment measured the distribution and mass of the hot gas making up the Galactic Halo. The next NASA Astrophysics CubeSat will launch in September of this year.

NASA has announced its first selections of four missions for the Pioneer program. One is a long duration balloon mission and the other three are SmallSat orbital missions. The mission concept studies for the Astrophysics Explorer Program are due on March 4 and NASA will be making a down-select decision this Fall. The next Explorer to launch is the Imaging X-ray Polarimetry Explorer (IXPE) set for November 2021.

The FY2020 NASA appropriation for Astrophysics (including the Webb Telescope) was $1.73 billion and for FY2021, $1.77 billion. In FY20, half of the budget supported the development of Roman and Webb. NASA spent another 15% building the other missions in the portfolio. NASA spent about 20% on community support (R&A program and GO programs). The Technology programs were about 10% of the budget. NASA is in receipt of its FY2021 budget. Congress provided a $7.3 billion budget for the Science Mission Directorate.

Mansi Kasliwal asked whether the smaller satellites are now increasingly being supported by non-NASA centers. Paul Hertz responded that one of NASA's goals for the Pioneer program is to have new institutions involved.

Kyle Dawson asked about Open Science Data and making publications available publicly regardless of the journal they are published in. He asked how NASA follows up with an Agency to ensure that they are using NASA data or data in NASA's repository. He further asked how NASA made that repository publicly available. Paul Hertz responded that NASA has been funding the ADS for over 30 years. It was also noted that all publications in astrophysics are placed in the ADS and NASA has arrangements with all the journals to put all the data/papers into ADS. NASA requires that all publications that are based on federally funded research are made public without subscription.

Priyamvada Natarajan asked if NASA will be collecting demographic data for teams, proposals and missions that have been funded. Paul Hertz responded that one of the recommendations that came from the SMD anti-racist action group for NASA is to be able to collect demographic data so that they can benchmark measure. At the moment, NASA does not have the authority to collect that data.

John O'Meara asked whether or not SOFIA will be in the 2022 Senior Review. Paul Hertz responded that SOFIA was granted a three-year extension in 2019 after the independent reviews. It will be reviewed again in 2022. He further stated that his preference would be for SOFIA to be included in the Senior Review. He further asked whether there are unfunded mandates that are going to require interesting ways to balance the budgets. Paul Hertz responded that if one adds up the additional spending and then compares it to the additional money received, one will notice the difference of $58.2 million, in technical term an "undistributed reduction." Hertz noted that this reduction would be absorbed into the FY22 plan without impact to the community.

Arecibo Update – Ashley (Zauderer) Vanderley, Alison Peck, Robert Moore

An update was provided to the Committee on the recovery and cleanup activities at the Arecibo Observatory following the collapse of the 305-meter telescope on December 1. The team was extremely grateful that the safety zones that had been established during the stabilization repair process were adequate and no one was physically hurt. NSF had every intention of repairing the facility and continuing science prior to the November 6 failure of one of the main cables supporting the telescope. NSF authorized the use of operations funds immediately after the failure of one of the auxiliary cables back in August 2020 and was in the process of making those repairs when one of the main cables broke on November 6. The failures of the cables had nothing to do with the hurricane repairs that were being addressed. One of the takeaways from these events is that the Observatory is not closed.

In 2020 NSF awarded a $762,000 supplement for a wide-band receiver for Arecibo; funded through the *Windows on the Universe* program. Congress appropriated $14.3 million in 2019 for repairs to Arecibo as result of damage from Hurricane Maria. There were many earthquakes in January 2020 and December 2019. On August 10, 2020, the auxiliary cable failure took place on one of the telescope towers. Through September, the stabilization efforts were planned with the engineers who were brought in to assess the damage; on November 6, a main cable from the same tower broke. Engineers informed the Arecibo team and NSF that if another cable broke, it would be a catastrophic situation. NSF decided to do a controlled decommissioning of the telescope, but before that could be done, the telescope collapsed on December 1.

Roman Space Telescope Update – Dominic Benford, Julie McEnery

NASA is pleased that the observatory has been named in honor of Nancy Grace Roman. The Roman Space Telescope will be conducting a wide-field infrared survey. The team is intending to expand the history of the universe utilizing a variety of techniques. Other objectives are investigating the growth of structure in the universe, an exoplanet census, a general observer program, and a coronagraph technology demonstration. The observatory is a telescope with 2.4-meter aperture that is equivalent to Hubble; this means that there is Hubble-like sensitivity and resolution. The field of view is 0.4-to-0.8-square degrees which is more than 100 times the field of view of equivalent instruments on the Hubble; there is a 0.11 resolution camera (298-megapixel camera). The second instrument is a coronagraph that operates in the visible band and is designed to measure contrast up to 10^{-8} to 10^{-9}; there is high data volume because it is a larger field of view but small pixel resolution.

The hardware was advanced to Phase-C (implementation phase) last February. In September 2021, a critical design review is scheduled. The science center is at the Science Telescope Science Institute and the Science Support Center at the IPAC; they are responsible for different aspects of science processing and the final archive and data analysis resources. It was noted that the development of the Roman infrastructure has been in partnership with a set of science investigation teams. The teams will perform precursor observations.

Mansi Kasliwal asked whether there are Roman elements within ROSES. Dominic Benford responded yes, because the Roman Telescope has the capability of doing various time domain astronomy surveys such as supernova and exoplanet microlensing. The data will be made public rapidly.

Priyamvada Natarajan asked for an explanation of the relationship between the SIGs that were selected previously versus the preparatory science versus the key projects versus open GO calls. Dominic pointed out that the current SIGs are a limited term group that was brought on to help design the mission and those contracts will end this year. Their work will help develop the operational phase that consists of the core community surveys.

Ian Dell'Antonio asked Dominic to clarify whether ROSES 2021 will be the final call for membership into things like key projects. Dominic responded there will be other preparatory science calls for key projects.

John O'Meara asked Dominic to expound more on NASA's sense about working in the era of very large surveys and data volumes, both from Roman and Rubin and potentially from other facilities in terms of how users will interact with the Roman data and how the Roman data is designed with some of these things in mind. Julie McEnery responded that the team has been paying attention to the lower level of the Roman development. Dominic went further by stating that at the project level and at the Headquarters level, the Roman Development team has a tri-agency group between NASA, NSF and DOE that has reported to the AAAC on several occasions. At the moment, each are supporting some level of work to enable some level of joint processing between three mission, including Euclid. The team is not ready to report out on any substantial advances on that yet. Paul Hertz added that moving forward, the team made sure that they have not prohibited this from happening in the future; it takes real resources from all three agencies and at the moment those resources are not available.

Astro2020 Update – John O'Meara

John stated that he contacted Rob Kennicut and Fiona Harrison a few weeks ago just to see if there were any significant updates after the AAS. The only update that was received is that they are on track for Spring delivery.

Nomination of the New AAAC Chair – Martin Still

The selection of the new chair started with opening remarks from Martin Still. It was noted that the new term starts at the September meeting.

After some discussion among the AAAC, Martin proposed that Priyamvada Natarajan be Chair and Kyle to continue to be the Deputy Chair, with an extra year on the Committee; Kyle's final year would be as Chair. Priya agreed to serve as Chair with Kyle as Vice Chair.

James Webb Space Telescope Update – Eric Smith

A detailed report on the Observatory and its development was presented. NASA and Northrop Grumman continue to work with COVID-19 social distancing protocols. JWST has sufficient funds and schedule margin with an October 31 launch readiness date. The Observatory is in its final deployment stage. Cycle 1 received about 1173 observing proposals.

Priyamvada Natarajan asked whether a decision has been made on the proposal deadlines cycle timing for HST and JWST going forward. Eric responded that the Cycle-2 call has already been released.

John O'Meara asked whether the COVID pandemic impacts the cycle significantly. Eric responded that it has had an impact. John then wondered whether there will be an additional Ariane launch between now and the launch of the JWST. Eric responded that there were two coming up and they both will happen over the summer.

Update from NSF Physics Division – Denise Caldwell

Denise Caldwell introduced Darren Grant, an IPA from Michigan State University as a new Program Director in the Physics Division. Denise also extended her gratitude to Jean Cottam for her years of service as Program Director for the Particle Cosmic Physics Component of the Particle Astrophysics Program; Jean is now the Deputy Division Director in the Physics Division. Denise also noted that AST's Nigel Sharp stepped in last year, first as a detailee, and then volunteering his own time to manage Jean's component of the Particle Astrophysics Program.

LIGO-Virgo has been extremely active scientifically. Observation run 3 (O3) was concluded prematurely due to the pandemic, but ran until about 10 months ago and produced quite several alerts. There was an unknown merger event observed that could involve the heaviest neutron star ever observed or the lightest black hole ever observed. The most massive black hole binary detected was another observation made. The team is getting ready for the next run and hopefully will be able to start in a little over a year. Detector improvements are underway.

Denise informed the AAAC that the NSF Physics Division has just awarded two new Physics Frontier Centers. One is the Network for Neutrinos Nuclear Astrophysics, and Symmetries (N3AS) and the other is the Center for Matter at Atomic Pressures (CMAP).

IceCube at the South Pole has been impacted by COVID. The IceCube collaboration was awarded the 2021 Rossi Prize recognizing a result that was proposed some years ago in high energy neutrino from a blazer.

The Plasma 2020 Report was released in May 2020. FY21 should be the final funding year for NSCL. The operations of the NSCL will be transferred to the DOE.

MEETING ADJOURNED AT 5:00 PM, 27 JANUARY 2021