

AAAC Meeting Minutes, June 15, 2020, Teleconference

Attendees: Ralph Gaume (NSF), Chris Davis (NSF), Allison Farrow (NSF), Elizabeth Pentecost (NSF), Renee Adonteng (NSF), Martin Still (NSF), Kathy Turner (DOE), Paul Hertz (NASA), Rob Kennicutt (Decadal), Fiona Harrison (Decadal).

AAAC Members: Nancy Chanover, Andrew Connolly, Kyle Dawson, Ian Dell'Antonio, Scott Dodelson, Mansi Kasliwal, Eliza Kempton, Petrus Martens, Stephan Meyer, Priyamvada Natarajan, John O'Meara, Constance Rockosi, Deidre Shoemaker

Ralph Gaume, NSF:

NSF Facilities during COVID: GONG, which inputs solar data into the Air Force and space weather models, has continued observing. Gemini North has recently begun observing. Daniel K. Inouye Solar Telescope has restarted its construction/commissioning phase. What has remained idle throughout COVID-19 is Gemini South, Cerro Tololo, Rubin Observatory construction (an MREFC program), ALMA, and Kitt Peak National Observatory. We need to recognize that there are significant risks and costs associated with restarts.

Everything at the ALMA antenna site is currently powered down, with the exception of a hydrogen maser, which uses a combination of solar power and a generator. One complication is that the site, although it looks relatively flat, is at a high altitude. Every one of the 66 antennas has a cryogenic cooler that cools down to approximately liquid helium temperature. In addition, there's a lot of electronics at the site. The correlator is also on this site and is subject to ambient heating and cooling. We're estimating that it could easily take a few weeks to bring ALMA back online once the "go" is given at both the site and the operation support facility.

NSF implementation of COVID: NSF is authorized to continue to charge salaries, stipends and benefits to the award. All of our awardees, including our facilities, have been in alignment with this guidance. Possible delays in the release of the decadal survey could impact any funding for large ground-based programs that are recommended from the decadal survey. NSF has implemented 100% telework policy on March 16 for its staff. NSF is one of the more fortunate agencies that can do most of its mission via telework. Work-related travel has been cancelled. All of NSF meetings and panels are now 100% video conference. COVID hit right in the middle of the AST panel season, but we successfully pivoted fairly quickly to begin all remote panels and made some necessary adjustments to our normal panel procedure to make sure that those panels ran really well.

MREFC programs (DKIST): DKIST, as everyone is aware of from my previous briefs, is at the very end of the construction cycle. It was originally scheduled to become operational at the end of this month. However, very recently (at the end of May) the National Solar Observatory held a restart review, and DKIST was approved for a Phase 1 restart on June 4. There are some high priority activities that are allowed on site, of course, with appropriate social distancing and personal protective equipment and the on-site workforce, which is composed right now of the teams that are on the island of Maui.

The governor of Hawaii has continued the 14-day quarantine for people coming to the Islands through the end of July. A lot of the commissioning activities for DKIST involve people from off Island, and the

DKIST Project Management Office is currently estimating the impact of the construction and also considering bringing people in.

MREFC programs (Rubin Observatory): there has been significant progress in getting some of the panels up on the dome, there's been significant progress inside the dome, and on putting together and reassembling the telescope mount assembly. It had been fully assembled in Spain at the contractor site, disassembled, shipped, and is now in the process of being reassembled. The building is now largely completed and was in the process of being occupied before COVID hit. Rubin Observatory, in terms of the NSF activities, was a bit over 80% completed. The target date for the beginning of operations was the end of September/early October 2022. There was significant political unrest in Chile, which had some impact on construction. Every few days, someone goes up to the site to check on the site and make sure everything is secure, since the dome hasn't been set. Of course, software development and ops planning are continuing. The telescope mount assembly has been enclosed in tarps; there are still parts of the dome that are open and subject to the Chilean winter.

AST Personnel: Jim Neff has been appointed (end of March) as the Deputy Division Director. He had been acting DDD from the middle of September until January or so; he's now the permanent deputy division director. Hans Krimm has been appointed as the Individual Investigator Programs Coordinator. We have two new IPAs that have come on board at the beginning of January, Sarah Higdon and Zoran Ninkov. Martin Still, who joined us in December, has now taken over as the Gemini Observatory Program Officer.

MPS Personnel: Anne Kinney, the Assistant Director for MPS left NSF on May 1 to become the Deputy Director of Goddard Space Flight Center. Sean Jones, who was the Deputy Assistant Director in MPS, has taken over as the Acting Assistant Director for MPS while the search for a successor goes on. And moving into Sean's position as the Deputy Assistant Director on an acting basis is Tie Lou, who is the Division Director of the Division of Mathematical Sciences.

NSF Personnel: France Córdova served a full six-year term as NSF Director, which ended at the end of March. Sethuraman Panchanathan was nominated by President Trump to be the 15th NSF Director back in early January. His nomination needs to clear the Senate. In the interim, Kelvin Droegemeier has been named as the Acting NSF Director. He took over on April 1. Kelvin is the current Director of the White House Office of Science and Technology Policy. And you may also be familiar with him as a former member of the National Science Board. Earlier last year, Paunch and four other members of the National Science Board toured all of NSF facilities in Chile. In October, France Córdova made her second trip to the Rubin Observatory.

Facility highlights: All of the nighttime optical and infrared facilities are under one umbrella now, and that includes Rubin Observatory operations (not construction), Kitt Peak, Cerro Tololo, Gemini North and South facilities, and SOAR. All are now under NSF's National Optical Infrared Astronomy Research Lab (NOIRLab). The Daniel K. Inouye Solar Telescope released one of its commissioning images, which got a lot of publicity; it is the highest resolution image of the solar surface that has ever been taken either from ground or space. Over the last few years, at 4.7 microns, Gemini North has been collecting images of Jupiter in support of HST and NASA's Juno mission; these images have a wealth of scientific information in them and made a great press release recently.

GBO: Fast radio bursts have gained a lot of attention over the last few years, and there are a lot of specialized instrumentation now for detecting fast radio burst. It's very important of course to find these repeating fast radio bursts to help track down the host galaxies.

Arecibo Observatory: in the era of COVID, Arecibo continues to make radar observations of potentially hazardous asteroids.

NRAO: ALMA has discovered a massive rotating disk in the early universe, and was able to determine the rotation through spectral line observations; the rotation velocity is about 272 kilometers per second. The VLA, combined with Hubble, were able to pin down the star formation rate at about 10 times that of the Milky Way galaxy. And of course, this result is very interesting in that it shows that only about one and a half billion years after the Big Bang there were large, relatively fully formed, rotating galaxies.

Satellite mega constellations: I think most people are pretty well aware of about 7000 current satellites in the catalog. And there are a number of companies – SpaceX Starlink, One Webb Amazon – that are launching more. SpaceX is to launch 10s-1000s of satellites. These satellites are intended to provide internet service to people on earth and are typically in an orbit maybe up to 1000 kilometers. NSF is funding a workshop through our NOIRLab, titled “Satellite Constellations”. It is scheduled for June 29 - July 2, and there are four working groups associated with this workshop. The working groups are focused on observational results and identifying the future observational needs; examining the simulations and the current status of simulations and figuring out what future simulations are needed; and exploring mitigation and ground based satellite materials measurement. Not only that, but also detected performance and operational strategies for satellites that can help mitigate the issue with astronomy, and also developing metrics for the optical and infrared. So the first two days of this satellite workshop will be a broader discussion with the community – if you're interested, go register. You can register for the first two days; day three and four are going to be limited mostly to the working groups that will be putting together their final white paper, which will focus on the four areas which are listed above. NSF is working within the federal government to understand the impacts on our observatories to identify mitigation opportunities and good practices. Rubin's Tony Tyson is working very closely with satellite launching companies to understand the causes of their optical brightness and define mutually acceptable solutions. The radio spectrum managers at NSF, Jonathan Williams and Ashley Zauderer, have been working very closely with all of these companies for a number of years on radio mitigation of these mega constellations of satellites.

AST FY 2021 programs and deadlines: There may be some deadline date changes due to the pandemic, but that isn't determined at this time.

Grants: All of the division's panels were held on time. The awards are going forward as planned. NSF has one large committee that is looking at this with regards to the pandemic's impact and restarts to university systems and to our awards.

MSRI-1 and -2: This is an NSF-wide program, one of NSF's 10 Big Ideas, which will continue on for at least the near term. No delays for MSIP (which has an alternating funding year cycle) are expected.

Astro2020: This is the first decadal that will cover the Astronomy and Astrophysics programs not only in astronomy, but also in physics and in polar. The divisions will get together as a unit and interdivisional group to move forward with implementation.

Kathy Turner, DOE:

Cosmic Frontier: Staff along with Kathy in the cosmic frontier program are Karen Byram, who's a detailee from Argonne, Drew Baden, who's an IPA from University of Maryland, and Eric Linder, who's an IPA from Berkeley.

Many of the cosmic frontier projects have interagency and or international partners and contributors and there are some with private contributions. Regarding strategic planning, we continue to follow our 2014 strategic plan report which, by early 2023, will inform the FY2025 budget

Snowmass project: held in Snowmass, Colorado. It's probably going to be held by Zoom. The community has laid out different Snowmass working groups. And that's feeding into a major meeting which will be taking place in 2021.

Black Lives Matter demonstrations: people are really understanding how this is affecting the whole country and globally. There was an academic strike on June 10.

Budget: DOE has seen a large increase in its budget, over 36% in the last five years. Research took a dip but it's coming back up. The research budget primarily funds our scientists, you know, including permanent scientists, students, postdocs, etc. in all phases of their research, whether they're designing, building or operating experiments or doing data analysis, so it is a little bit different than many in the astronomy community typically associate with the research.

DESI: DESI was ready to take data; it was commissioned in mid-March. It is the premier multi-object spectrograph and is the first stage for the dark energy project; it was designed and built over 10 years through a large collaboration, many institutions 13 countries. The total project cost is \$56 million.

Funding plans: Back in May, just over a year ago, DOE and NSF came to an agreement to provide about equal support for operations; a planning team between the agencies will investigate options for laying out new scope and budgets. DOE is considering international in-kind contributions in exchange for data rights and access during the two-year proprietary period. Previously, the international partners were going to provide monetary contributions. This has now been changed to international in-kind contributions. There's a process on how to select their proposals. The first phase, Letters of Intent, were submitted in December. The process to develop those contributions is ongoing. Now, the goal is to have the basic agreement in place by the end of the year. The priority for these in-kind contributions is to offset our agency operations costs. The second priority is to enhance US science. The agencies are going to make the final decisions on these.

Joint NSF daily operations planning status review: This was held in April via Zoom. We're getting that report; a number of very good recommendations are being considered by the operations planning team.

Fermi glass is continuing full operations during COVID and there's no COVID in space. So, all remote at-home operations have been successful.

The *Alpha Magnetic spectrum spectrometer*, which is on the ISS, continues full operations during COVID. This is a multi-purpose particle physics spectrometer for high energy and medium energy cosmic rays; large international contract collaboration with daily ATP leading the US science roles. Under an agreement with NASA, we're responsible for the science program; NASA is providing the ISS power and mission management. Recently there were four launches. It's expected to continue through the life of the station.

Direct detection Dark Matter experiments: It's been a really heroic effort to keep that going. There is a new initiative for small projects in dark matter direct detection that is due to recent theoretical demand, advances and development. Six proposals are to move forward, to develop their concept and execution plans or potential small projects. Four of these are in cosmic frontier.

Other new initiatives: A number of initiatives have a lot of overlap with the cosmic frontier for next generation planning. DOE has excellent science results that continue to be produced from operating experiments; these are coming out all the time. The P5 plan continues to be supported by the community and Congress; to enable it to be fully implemented. The budget has been increasing over the number of years – it increased 7% in FY20. A number of the cosmic frontier projects from Astro2010 and P5 are about to commence. DESI has completed commissioning and it's ready to operate. The LSST camera project is 96% complete and is moving on to the next phase. We're looking forward to Astro2020's assessment of the most compelling science challenges and research.

Paul Hertz, NASA:

New activities: Fomalhaut b, which was one of the first planets that was directly imaged, has disappeared. Hubble has been watching it for almost a decade and a half. The current model is that it actually was never a planet, but rather was a hotspot caused by two planetesimals colliding. And we caught it at just the right time and have watched the dispersion of the collision event as it faded away.

There are caching tubes that will be carried to the surface of Mars by the Perseverance rover. This rover has tubes on the underside, which would fill up once samples have been acquired by the mechanism on the surface of Mars. This is one of the last parts of the rover to be integrated because the cleanliness requirements on the caching system are the highest of anything NASA has ever done. Perseverance will collect and cache the samples that will be returned later. What we don't want to do is to return the samples, open them up in a very clean room and find Earth microorganisms on them. The cleanliness requirements are extremely stringent for this project. The first Mars 2020 launch attempt will be on July 20 from Florida.

WFIRST's name is the Nancy Grace Roman Space Telescope, named after Nancy Grace Roman, NASA's first chief of astronomy and NASA's first female executive. It was through her leadership and her dedicated efforts that NASA began developing a successful space astrophysics program. She led the early orbiting solar observatories and orbiting astronomical observatories. And she also led the effort to get approval for a large space telescope, which is what eventually became the Hubble Space Telescope.

COVID-19 impacts at NASA: All of the operating missions continue to operate nominally through telework and remote access. The exception is SOFIA, which cannot be operated remotely. It's not a drone, and is currently not flying. NASA has initiated the scheduled maintenance on SOFIA. NASA

continues to solicit reviews, select and fund proposals through telework and virtual reviews. OMB has provided agency for flexibilities to better support us to better support the community. We did cancel one call – next year’s astrophysics data analysis program. We also delayed some of our due dates.

Plans in science: We just released our new NASA science plan for the next five years (vision, mission values and focus areas). It’s available for download. The fourth priority within the science plan is inspiration. Part of that priority is increasing the diversity represented throughout our portfolio. We recognize the importance of diverse and inclusive teams; we want to take a strategic approach to managing our workforce, strengthening our recruitment practices, and taking the opportunity to be leaders in growing a more diverse and stronger community. We are also stepping up our investment in students and early career faculty to make sure that we have a strong pipeline. We are taking the time to consult with experts and identify the things that the NASA Science Mission Directorate can do as an organization to play our part in eliminating systemic racism.

We have asked the National Academies’ Space Studies board to conduct an ad hoc study on how we can improve access to principal investigator opportunities within NASA, and to identify the roadblocks that are preventing our principal investigator community from being as diverse as the science community itself. The Nancy Grace Roman Technology Fellowship program identifies two or three early career fellows every year. This is limited to people who are working in technology or suborbital mission areas. Selections for 2020 have not yet been made but will be done this summer. We have 24 new NASA Hubble fellows. These fellows are spread across all three of the thematic areas that we support in astrophysics, and they will be serving their fellowships at universities and other research institutions across the country. This is a portable fellowship, so the fellows do get to take their fellowship with them to their choice of host institution. NASA doubled the amount of funding being put into graduate student research fellowships. Another effort we’re making is anonymous peer reviews to address implicit bias. Rather than concentrating on the individuals who are proposing, the institutions they come from, or the result of the successes they may have had in the past, including their general reputation, the peer review is concentrating completely on the merit of the science that is being proposed. Hubble has done this for two cycles. We have adopted it for all of our guest investigator and general observer reviews for all of our TACs across astrophysics.

NASA research program: The funding that is going to the community is consistent with the President’s budget request. Regarding COVID impacts, we are putting in place a process which will allow us to make limited adjustments to existing grants. We don’t have any reason to expect that our budget will be increased to allow us to handle the impact of COVID, though we will be focusing on mitigating the impacts of COVID on the most vulnerable members of our community, which are graduate students, postdocs and soft money, early career researchers. We have the flexibility to grant no cost extensions and augmentations for people who are currently funded and to complete their work. As for panels, there are now shorter days but over more multiple days for reviews. We have a number of FAQs available to help the community, figure out what’s available to them. We are cancelling the ADAP call next year to decrease work while recovering from the pandemic, and we are doubling the selections this year. However, we have received input from the community pointing out that this policy may have a disparate impact on some classes of researchers in our community, in particular, those people who are dealing with childcare (particularly women), or eldercare, or other personal issues in their families and homes that were caused by COVID and do not have the time to write proposals this year.

We will be supporting proposals for limited upgrades for lab equipment for our lab Astro program. So our goal is to enable new science or new equipment or to replace and upgrade failing equipment.

The community has been concerned about the low selection rate in the exoplanet research program. We have completed consolidation of the exoplanet research program. All four divisions are now solicited through this single exoplanet research program. The one exception is technology; proposals are still included in the technology programs, but no longer will exoplanet research be supported in the data analysis program, the theory program, or in the lab Astro program. All of those proposals now come to the exoplanet research program. We are also significantly increasing the funding available to this program growing from \$8.9 million in the current fiscal year to a planned \$12.7 billion – 43% increase over three years. We will wait and see how that impacts the selection rates.

Citizen science support: We have begun a set of citizen science workshops which take place every Wednesday in order to help people figure out how to get started on citizen science at NASA. In the NASA Science Mission Directorate, citizen science is a tool for doing publishable research, not for educating the public. All of our citizen science programs have research objectives associated with them. We will provide funding for people to prototype a citizen science project so that they are better positioned to propose it as a meritorious method of doing publishable science to one of the regular research programs.

Space communications and COVID: One thing that we were worried very worried about, and continue to watch closely, is our space communications antennae and network stations, because those require on site people at all times. Some of them are in places like Madrid that had very serious COVID outbreaks. So far, we have not had to close any of them. When we've had maintenance problems we've been able to bring people in to correct them safely.

Next decadal preparation: NASA invests in the technology necessary for enabling the missions that are under consideration. Given that we'll get the decadal survey report next spring, can we be able to start those new initiatives in FY23. Within the research recommendations we get, we assume that we'll deal with those within the existing budget, and that they will inform our priorities in that manner.

Webb launch date: the project will have a review at the end of June or early July. The pre-environmental review will make recommendations as to what an appropriate launch date will be.

Rob Kennicutt & Fiona Harrison (Decadal Survey)

Fiona:

Survey: The structure of the survey is a steering committee with 20 members. That committee oversees the process, whose job it was to look at the extraordinary scientific opportunities in the next couple of decades and where they are ripe for major advances. New for this survey is a panel which is considering cross-cutting issues like computation and infrastructure items. Also new is a state of the profession and societal impacts panel; previous surveys have considered these issues but have not been charged (in the formal charges from the agencies) to make actionable recommendations. The pandemic has caused us to make some changes and re-evaluate, which has slowed down the pace of the survey.

From the point of view of NASA, we didn't feel from those discussions that the timing is critical, because they're still in the midst of WFIRST. However, there is time pressure from NSF who have said publicly that they would like to have ambitious projects for the MREFCs.

Progress: We are both fairly pleased with how much progress has been made. Remotely, the program panels were all able to complete their deliberations. We switched to virtual steering committee meetings, which have been effective. There's been public briefings with two-way dialogue, which enabled us to focus on where we needed more information; we will hold follow-up meetings soon with the steering committee since it was inhibited by remote meetings. The quality of the program panel reports we've received have been superb. Our commitment to keeping the requirement that we deliver a high-quality survey will not be compromised.

Rob:

Proposed bill: There was a bipartisan proposal to expand NSF as well as expand the budget increased for basic science. We don't know that it's going to pass; if it does, we don't know what the final budgets will look like though it may be folded in.

Trace: One example of a change from 2010 is that we built in a formal mechanism for feedback/interaction from the projects after an initial trace assessment of questions if there was a big variance. Another thing we've tried to emphasize for the space projects are the large, early stage concepts. They're designed to determine cost boxes, permissions and identify risks. Educating the community should happen on what trace tells you and doesn't, and how we actually fold that in to the ultimate prioritization process.

AAAC discussion: The biggest single impact from COVID for the community will be people finishing postdocs and going into faculty jobs. The impact isn't just in the research. It's also the impact that the way that postdocs communicate and advertise themselves is typically over the summer through all of the various meetings. And that's going to have a longer-term impact than just a few months of reduction in efficiency of doing science.

Congress has provided NSF with extra money for COVID research, but no money for assisting in the recovery of the academic community. DOE is in the same kind of position. In some cases, it might have been a PI who didn't review as well, but we gave a little extra money to ensure that they didn't drop their students from postdocs, while telling the PI that that specific funding was a priority.

The AAAC will draft a COIV response letter. We can make the argument that Congress should consider appropriating new money. We don't normally wade into the waters of making explicit recommendations about budgets. Congress is going to be beginning markup very soon on new legislation on new appropriations for the next fiscal year. But also, because Congress is probably going to be writing COVID money bills for a while.

Next meetings: September 21-22, 2020 (remote), January 26-27 (TBD location), February 24 afternoon remote.

John is Chair for another year. Kyle is the newly positioned Vice/Deputy Chair.

John will circulate to the committee a draft Google Doc.