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MEETING MINUTES

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Brad Peterson, Chair

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Hashima Hasan, Executive Secretary

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Introduction and Announcements

Dr. Hashima Hasan, Executive Secretary of the Astrophysics Subcommittee (APS) of the NASA Advisory Council (NAC), opened the teleconference by calling roll. Dr. Bradley Peterson, APS Chair, welcomed the members and noted that there was a full agenda.

Astrophysics Division Update

Dr. Paul Hertz, Director of NASA's Astrophysics Division (APD), began his update of Division activities with a review of the science highlights.

Science Highlights

The Nuclear Spectroscopic Telescope Array (NuSTAR) identified an ultra-luminous pulsar where investigators had expected to find a mid-mass black hole. This challenged the theorists to the point that they had to revise their theories.

The Hubble, Spitzer, and Kepler telescopes characterized the atmosphere of a "hot Neptune" exoplanet, which was a further advance. Another Spitzer result was the discovery of change in a debris disc around a star. This has been interpreted as a collision between small bodies in the disc, increasing the temperature. Hubble provided the clearest images of the Comet Siding Spring near Mars; simultaneous observations by the Mars Atmosphere and Volatile Evolution (MAVEN) mission and other Mars orbiters showed the impact of the comet tail hitting the Mars upper atmosphere.

Dr. Hertz showed a list of all the astrophysics press releases that have come out in the past few months. It is important to share the science with the public and articulate what the Division is doing.

Personnel

There have been significant changes to the Science Mission Directorate (SMD) organizational chart. Mr. Chuck Gay recently announced his retirement from his position as Deputy Associate Administrator. Candidates have been screened for the James Webb Space Telescope (JWST) Program Director position. Kristin Erickson is the new Director of Science Engagement and Partnerships, which used to be known as Education and Public Outreach (E/PO). The new SMD Chief Engineer is Joseph Pelliciotti. The Heliophysics Division (HPD) Director and the Mars Exploration Program Director jobs have been advertised.

Within APD, Dr. Linda Sparke was starting a 1-year detail assignment to the Marshall Space Flight Center (MSFC) in December 2014. Dr. Wilton Sanders will be the acting research director in her absence; Eric Tollestrup will take over as Euclid program scientist while she is gone. APD has advertised for a civil servant program scientist, and Dr. Hertz encouraged applications.

Budget

Regarding the budget, APD is expected to do great things with the substantial funding provided. JWST is on schedule and budget for an October 2018 launch. The Division continues working on the Wide-Field Infrared Survey Telescope (WFIRST) to follow JWST. The Fiscal Year 2015 (FY15) budget request calls out pre-formulation funds for WFIRST/Astrophysics Focused Telescope Assets (AFTA), and Congress has shown interest in this.

The Stratospheric Observatory for Infrared Astronomy (SOFIA) mission completed its development, moved into operations, and will now be considered to be in prime operations. APD is developing Explorer missions, having confirmed the Neutron-star Interior Composition Explorer (NICER) and Transiting Exoplanet Survey Satellite (TESS), both of which are in Phase C implementation. APD is also working on international contributions to missions. Talks continue with the European Space Agency (ESA) regarding partnering on the Advanced Telescope for High Energy Astrophysics (Athena) and a gravitational wave mission. There is an announcement of opportunity (AO) out for the next Small Explorer and the next Mission of Opportunity (MoO). APD plans to issue a mid-Explorer AO around 2016/2017, depending on the budget. Subsequent to the 2014 Senior Review, APD found a way to continue Spitzer and the Division also found augmentation funds for Planck through the next year.

More specifically in regard to the FY15 budget, NASA is operating under a Continuing Resolution (CR) through December 11. The Administration proposed to terminate SOFIA, but Congress has ordered NASA not to do so before they consider the proposal as part of the appropriations process, and therefore the Division continued operating SOFIA as planned during FY14, including sending it to Germany for scheduled heavy maintenance. After the completion of the heavy maintenance visit, the program will proceed to complete Cycle 2 science, then move to cycle 3.

Total current and projected Astrophysics spending, including JWST, assumes a flat budget. As JWST approaches launch, a flat budget in fact frees funding for APD to formulate WFIRST. Both houses of Congress marked up the President's FY15 budget request, adding funds to continue SOFIA and augmenting HST and SMD education. The Senate included additional funds for WFIRST. There is optimism that Congress will provide funding for FY15 before the CR expires in December. The CR funds allow NASA to operate through December 11, and provide a prorated share of FY15 funding during that period. APD made sure that all projects could get through that time without having to slow down or stop. In their budget markups, the House of Representatives increased the APD budget by about 10 percent, and the Senate by about 15 percent. The bulk of this increase is for SOFIA and does not affect other APD programs. Congress will likely provide written direction on SOFIA, which is typical of increases.

JWST and WFIRST

JWST's Integrated Science Instrument Module (ISIM) just completed a second successful 116-day cryo-vacuum test. Five flight sunshields have been completed, including deployment testing, and two others are being manufactured. The spacecraft bus is past the critical design review (CDR) phase. The pathfinder telescope backplane has had two spare mirrors and a spare secondary installed, and the flight telescope backplane wings have been installed. Program remains on track and within budget for October 2018 launch.

The WFIRST preformulation activities are concentrating on risk reduction for the observatory and technology development for the instruments. There is a WFIRST/AFTA line in the FY15 budget request. APD solicited WFIRST preparatory science proposals through the Research Opportunities for Space and Earth Sciences (ROSES) mechanism, receiving over 50 responses. Dr. Hertz expected to have about 12 selections by the end of the calendar year, but this depended on the FY15 budget.

The science definition team (SDT) will report to him with cost updates in January. There will be a full cost analysis of the AFTA version, both with and without the coronagraph. Dr. Hertz hopes to provide this information to the mid-decadal review.

SOFIA
Dr. Hertz next provided more detail on SOFIA activities. The aircraft has been in heavy maintenance and was stripped down so that the Lufthansa-Technik technicians could look for evidence of cracking and corrosion. They found about what they expected for an aircraft of SOFIA's age and history, and made repairs.

NASA's Office of the Inspector General (OIG) and a targeted ad hoc review group that reported directly to Dr. Hertz provided reports with similar suggestions on SOFIA. Both advised changes to increase scientific productivity, with a move away from flight hours as the sole metric and more emphasis on science throughput. They also advised more concentration on instrument development, and recommended revisiting the funding of data analysis. SOFIA's unique capabilities are the region longer than 27 microns and very high spectral resolution, and these should be the mission's science focus.

One issue was whether NASA was doing a good job of planning for 20 years of operations. The normal NASA model builds for a specific period of time, but SOFIA is different. A re-prioritized program baseline will incorporate the findings and will take further shape after the next President's budget request, which will be issued in February. Dr. Hertz committed to providing the APS a copy of the OIG report summary and the APD response at the next meeting.

Other Programs
NASA will complete delivery of its share of the Astro-H hardware by the end of the calendar year. The payload is being integrated and tested.

Athena is the next large mission of the European Space Agency (ESA), after the Jupiter Icy Moons Explorer (JUICE), and NASA is discussing its role in the partnership and what the Agency might contribute. NASA and ESA are looking at possible NASA contributions, including portions of the X-ray calorimeter instrument (X-IFU), the wide-field imager, and/or the x-ray mirror, as well as the U.S. node of the science data center. The Athena science study team has decided to have a system of working groups over the next few years. NASA will select and fund travel for one U.S. participant per group; others may join without the NASA funding.

NASA and the National Science Foundation (NSF) are conducting a joint exoplanet research project, as recommended by the Decadal SurveyS. The program has two stages:

- Stage 1. FY2015 – FY2018, in which there will be an exoplanet-targeted Guest Observer program with existing instrumentation on the WIYN observatory using the 40 percent National Optical Astronomy Observatory (NOAO) share of WIYN time. NASA will release a solicitation in early 2015 for a facility-class extreme precision Doppler spectrograph (EPDS) for the WIYN telescope, with the goal of commissioning in 2018. This will be available in time to coordinate with TESS.
- Stage 2. FY2018 – forward, in which the above programs will continue. In addition, NASA will develop and maintain a data management system to serve EPDS data products, and provide community access to an EPDS instrument in support of NASA missions.

The NASA goal is to enable both follow-up observations supporting other NASA missions, such as TESS and JWST, and pathfinder observations to inform the design and operation of future NASA missions, such as WFIRST and future exoplanet missions.

In the Research and Analysis (R&A) area, funding has gone up over the last 6 or 7 years, but the number of proposals has increased even more, so that the selection rate has dropped. NASA is seeking the cause

behind the increase in proposals by participating in a task force of the Astronomy and Astrophysics Advisory Committee (AAAC). The R&A theory area will not be part of the next solicitation. This is a result of both sequestration and a stretching of time for funding. To get the calls and funds back in sync, the Research Opportunity for Space and Earth Science (ROSES) 16 call will include theory, with funds available to investigators right away in FY17.

Dr. Gary Melnick pointed out that the Astrophysics Data Analysis Program (ADAP) percentage went up from 12 to 21 percent. Dr. Hertz explained that ADAP funds were increased as a factor of Kepler data going into the archive. Dr. Natalie Batalha sought more information about the exoplanet research line. Dr. Hertz said that funding did not decrease, but for that program, as well as ADAP and the Astrophysics Research and Analysis program (APRA), APD has not closed out the "maybes," funding for which depends on the FY15 budget. Many of the APRA reviews are still not out largely due to the Division workload. The panel reports take time and trail the selections.

In further discussion of the data, Dr. Hertz said that he would see what he could do to provide information on the funding pressure. This can be a misleading statistic, as it is dominated by a few people asking for an unreasonable amount of money; this skews the data. APD does not have data on the number of members of the community who are funded, as it just funds the principal investigators (PI). Dr. Chryssa Kouveliotou said that there is usually a maximum amount that PIs can request.

Dr. Jason Kalirai observed that most missions are oversubscribed by a factor of four or five, but SOFIA has only twice the number of proposals. Dr. Hertz explained that SOFIA was still balancing the times allotted for the proposals receiving first priority, filling in with those given second priority. He added that the call came out after the notice that SOFIA would be cancelled, which could have been a factor in discouraging proposals.

Education and Communications
NASA is restructuring the E/PO area, which is now Education and Communications. Communication will remain a responsibility of the missions, and will include outreach, web sites, news releases, etc. Education will no longer be under the missions, but instead will be consolidated at the SMD level. SMD is competing the providers to implement this, and the draft solicitation is out for comment. The objectives are to enable science, technology, engineering, and math (STEM) education, improve science literacy, advance national goals, and leverage through partnerships. SMD hopes to select education providers next summer and fund them in FY16. FY15 will be a transition year.

APD is funding four E/PO activities that will transition to new providers by the end of FY15. The Division has consolidated its Education programs into four science areas and assigned the following providers:

- Cosmic Origins: Space Telescope Science Institute, Baltimore MD
- Physics of the Cosmos: Chandra X-ray Center, Boston MA
- Exoplanet Exploration: Jet Propulsion Laboratory, Pasadena CA
- SOFIA Airborne Astronomy Ambassadors: Armstrong Flight Research Center, CA

The draft cooperative agreement notice (CAN) shows that this is a full and wide open competition available to academia, corporations, current providers, etc. Everybody can propose. A plan will be worked out for the hand-off; APD will ensure that there is no gap and will consider extensions if they are needed. The proposers must state what they want to do, and how they will do it: continue the status quo, present new ideas, transition, bring in partners, etc. The competition is meant to explore if this can be done better or if the current system works best. Dr. Hertz explained that in FY14, the missions were

required to explain how they would handle communications in FY15. SMD will handle education, and any outreach that does not fall under education is within the mission operating line.

Dr. Hertz said that Dr. Sparke had given him the ADAP selection numbers. APD over-selected ADAP in FY13, resulting in a second year funding fluctuation that shows up this year. In addition, exoplanet research funding is down because the Division selected a few more expensive proposals this year.

Mission Concepts for 2020 DS

Dr. Hertz addressed preparations for the 2020 DS, noting that in order to have a well-informed DS committee, especially in regard to the large, strategic missions, NASA needs to provide the committee with information about candidate mission concepts. This includes the science case for the mission, a straw-man design reference mission (DRM) with options, a technology readiness assessment, and a cost box. This is what the committee needs in order to do its work. In addition, NASA needs to initiate technology development for candidate missions.

APD will identify a small number of mission concepts, initiate studies with a science and technology definition team (STDT) partnered with a NASA center for DRMs, conduct the studies, identify the technology requirements as early as possible to get them into ROSES, then have a STDT report by 2019.

Dr. Hertz would like to do this via the program analysis groups (PAGs). The number of missions people are talking about is small, and the PAGs would be the top candidates for this task of doing the analysis and reporting to NASA. The goal is to have each PAG recommend one or two missions for study. APS will then collect this input and provide Dr. Hertz with a list of candidate missions. This exercise involves only large missions, not probes (medium missions), as the latter can be addressed later and in a shorter timeframe. For the current DS, APD made a substantial effort to look at 19 probe studies but got little value from that in the DS. He provided feedback to the National Research Council (NRC) noting that he did not understand why the DS only used mission information as presented by advocates.

Dr. Kenneth Sembach was concerned about this, especially in regard to costs. He said that if a probe call is done again, it has to be more transparent so that the community can understand costing better. This was not clear the last time. Dr. Hertz said that while APD cannot tell NRC how to do costing, this is valuable input that the community can give to them. The costing model has evolved, but he agreed with the concerns. All NASA can do is provide input to the committee; NRC determines its methodology. The community should provide that input to Dr. Alan Dressler.

Dr. Melnick said that it seems that the most important preparatory work that APD could do would be to estimate the amount of discretionary funding available, though that is difficult. It was badly off in the last DS. The exercise might better inform the community whether the emphasis on large versus probe missions is apt. If WFIRST leaves the Division with a small discretionary pot of funds, that would be useful information in terms of promoting probes. Dr. Hertz said that he will do his best on that in 2019, but he cannot do it now. Regardless of the discretionary funding, the DS should figure out the balance of large and medium missions and their cadence. The DS recommends priorities for an optimal portfolio. In addition, APD will provide NRC data on candidate missions recommended by the committee and some sort of information on candidate probes. It will be due in 2019, and the probes do not take as long to study, so he is not starting that now. He does not want NASA to decide on large missions versus probes, that is the role of the DS. Also, if one assumes that APD funding will be flat, one can continue all of the base programs, Explorers, JWST, WFIRST, etc., and assume the operating costs. In that scenario, the remaining funds allow the Division to complete and launch a large mission after WFIRST in the late

2020s and begin another one. That is why it is worth looking at large missions. He assumes APD can do a large mission after WFIRST. His objective is to give the DS committee all they need in order to prioritize among the choices.

Dr. Sembach asked if Dr. Hertz wanted APS to provide a consolidated list with no downsizing. Dr. Hertz replied that APS can downsize if that is what the members want to do, but he did not want to over constrain them. He suggested adding their thoughts to the PAG reports. PAG members are eligible to join the STDTs, which will be wide open. The studies are not procurement activities, so there are no conflicts of interest. He wanted the recommendations to come from the full PAGs, not just the executive committees.

Dr. Hertz presented two potential timelines, noting that neither had ideal timing. Timeline A assumed a PAG jamboree in the summer of 2015. Timeline B had the meeting occurring in January 2016. The timelines juxtaposed timing versus participation. Dr. Kalirai thought the aggressive timeline would be better for technology development purposes. Dr. Sembach agreed, but noted that community perception might be an issue, since the more aggressive timeline would not include a broad swath of people in the absence of funding. A face-to-face meeting should be associated with a large gathering, and therefore Timeline B would get more buy-in.

Dr. Hertz noted that there had been talk of having the meeting at the upcoming International Astronomical Union (IAU) meeting, but there is a perception issue in having a NASA workshop in Hawaii. Dr. Karl Stapelfeldt pointed out that Timeline B does not get ahead of the mid-DS review. Also, as a PI, he hoped that there will be a similar process for the probes with the Aerospace Corporation (Aerospace) costing and interactions so that Aerospace can better understand the small missions.

Dr. John Nousek expressed concern about the role of the PAGs in this. PhysPAG has disparate communities, and he has seen simple efforts result in feedback challenging the legitimacy of the PAG to make decisions. PAGs can be useful for analyses, but in the end, the members are volunteers, essentially whoever shows up. Dr. Kouveliotou shared these concerns and added that the PAGs should not take on the work of the DS committee. Dr. Peterson noted that about 20 years ago, the same thing was done, and there was a competition to jump-start some mission concepts, which was useful.

Dr. Hertz said that the DS committee can study and recommend a mission that NASA has not studied. Leading to the last DS, NASA had looked at the Laser Interferometer Space Antenna (LISA), the International X-ray Observatory (IXO), and the Joint Dark Energy Mission (JDEM) mission, but did not fund studies of anything else. [Note added during editing: NASA also funded studies of SIM.] Dr. Hertz wanted a community process to identify candidate mission concepts. He was proposing going through the PAGs instead of proposals because he had talked to a lot of people, asking for lists of potential missions. He consistently got fewer than 10. The ideas not on that list are unlikely to end up being the top priority. He was suggesting that this process might allow more community participation with less burden than a ROSES call.

Dr. Fiona Harrison said that the PAGs do not have high visibility in the community. The average astronomer is not engaged in or even aware of the PAGs. Dr. Hertz explained that he agreed, but whether or not people know about the PAGs, he would like them to hold community workshops leading to a list.

Dr. Nousek explained that the PhysPAG executive committee cannot even decide where to hold a town hall. The x-ray community is based in the American Astronomical Society (AAS), but the gravitational wave community does not show up because they do not find AAS events useful. This disadvantages the LISA community. Dr. Sembach added that for the Cosmic Origins PAG (COPAG), AAS is the only opportunity to get together. Since there is a need to have face-to-face meetings, it was unclear how to proceed without going through the PAGs.

Dr. Kalirai reminded APS that something similar was done in developing the 30-year Roadmap. The Roadmap team held an online town hall and solicited papers. Dr. Kouveliotou added that about 150 people participated in the virtual town hall, and many papers were submitted.

Dr. Hertz suggested that there be more discussion about this. He specifically asked to hear more from those concerned about the PAG process and whether they would prefer proposals or papers. He noted that a different group would participate in the latter scenario.

Astrophysics Implementation Plan

Dr. Hertz explained that APD has a number of driving documents. One of these is the APD Implementation Plan, which explains how the Division intends to implement the DS. It is now time to update that document, and a draft has been prepared.

Dr. Rita Sambruna told APS that the update has been in process for a few months, and will supplement the 2012 Plan, which is not being revised. This update will provide a summary of events and developments since the publication of the Astrophysics Implementation Plan in December 2012. Among the new developments since 2012 are the following:

- JWST is on schedule and within budget for a launch in October 2018.
- Preformulation and technology development for WFIRST/AFTA are underway with support from both the Administration and Congress.
- NICER was confirmed in February 2014 for launch in 2016.
- TESS was confirmed in October 2014 for launch in 2017.
- Calls for a SMEX and an MoO were issued in September 2014.
- There is increased partnering with ESA on missions that meet DS priorities, such as Euclid, Athena, a gravitational wave observatory, and others.

The update had been distributed to the APS membership, and it was scheduled for public release on December 15. Dr. Hertz planned to make a presentation to the community at the NASA Town Hall during the January AAS meeting in Seattle.

APS Discussion

Senior Review Results

Dr. Sembach reported that the Wide-field Infrared Survey Explorer (WISE) project contacted him in regard to whether APS would consider funding for the analysis of data from the Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE). There is no funding for the project in FY15, but the team wondered if it could be part of the FY16 budget, given that the Senior Review had very positive feedback. Funding was found for Spitzer and Planck, so it might be possible. Some members of the community see the Division as giving different missions different treatment.

Dr. Hertz said that he did not want projects that dislike the Senior Review results to appeal to the APS. Dr. Peterson was emphatic that the discussion be terminated immediately, stating that APS is not an appeals court. Dr. Sembach agreed, but he thought he would mention the issue. Dr. Peterson said that APS had already considered whether to reconsider the Senior Review results, and decided that it would not do so.

Flagship Mission Candidates

The discussion returned to strategies to identify candidates for upcoming flagship missions. Dr. Kouveliotou suggested that APS have a small committee that would develop a scheme that APS might endorse. Dr. Nousek cautioned that scientists in a particular area might advocate more strongly than others and thus have a disproportionate voice. Dr. Peterson said that Dr. Neil Cornish had sent him a statement saying that the PAGS are not set up to make selections, and Dr. Cornish did not see how they could make recommendations that all might accept. Dr. Peterson said that the concern is how the missions would be selected. The objections are philosophical, that APS should be open to missions that have not yet been envisioned.

Dr. Nousek said that an issue is the down-select of one or two missions, while there is also concern about how much representation would be at an AAS meeting. No single venue will be representative. Dr. Sembach suggested having the PAGs present ideas to APS, which can examine them and send them to Dr. Hertz. Otherwise, APD will have to hold an official call, which would be more restrictive in that it would only include those who write for it. It should not be too hard for the PAGs to find the good ideas. The TechSAG has received a lot of ideas, which were prioritized. After discussion, there were five or six key ideas. That process worked. If it were an x-ray mission, the x-ray group can work it out. He would not do this at the executive committee level, but the PAGs can gather information. Dr. Hertz thought that that would work. He hoped that the PAG process would bring him something more thoughtful than if he just put out a call for one-page white papers and got 90 of them.

Dr. Nousek said that it would be important to present the DS committee with a well-explored set of funding and TRL information. There will be tremendous pressure on the DS committee to choose a well-developed option. The stakes are enormous. Dr. Peterson added that APS does not want to have proposals for missions where no one knows what they do or cost. While the DS committee and others might differ on what can be funded at what frequency, it is at least important to know what the missions cost. If there are not mature concepts ready for the DS, opportunities will be lost.

Dr. Hertz explained that one of the values of identifying concepts early is that the STDT can put more time into tweaking and balancing them, which takes more time than the DS committee will commit. NASA has always provided the DS committee with a small number of ideas; the DS has never started from scratch.

Dr. Nousek suggested an alternative in which Dr. Hertz would identify the large missions he keeps coming across, then go to the PAGs and ask for their input. If that results in opposition due to good missions being left out, those missions will be identified and Dr. Hertz can add them. While Dr. Hertz needs the credibility that comes from consulting the community, Dr. Nousek felt that he had already addressed that. Dr. Stapelfeldt added that some mission concepts cross PAGs, and it is important to include them.

Dr. Sembach said that if the PAGs are not involved, and APD sends out a solicitation or APS studies concepts, that leaves them where they are now. He assumed that APS would prefer to give Dr. Hertz

guidance sooner rather than later. Dr. Kalirai agreed. He did not think they should have APS studying this; the input should go to Dr. Hertz.

Dr. Hertz explained that for the current DS report, issued in 2010, LISA, IXO, and JDEM were left over from the previous decade. [Note added in editing: and SIM.] There are no leftovers this time. APD is planning to do WFIRST, IXO is part of Athena, and NASA could do LISA with ESA's gravitational wave observatory. There are no medium-size missions. The Roadmap addressed much of this and is therefore the starting point for discussion with the PAGs.

Dr. Hertz added that APD could realistically support up to five STDTs. Dr. Peterson noted that it would be unfair to ask the community to jump through more hoops. At some point, APS must decide that there are some missions worth encouraging. Dr. Giovanni Fazio asked if there were any concepts not considered in the Roadmap. Dr. Kouveliotou replied that nothing large from the COPAG was rejected, and the Roadmap team heard from everyone who had ideas for flagship missions, including some missions that overlapped communities. Dr. Batalha suggested having the PAGs review the Roadmap, though she was concerned that the Roadmap might be more oriented to stakeholders than the science community. The Roadmap team did not consider budget issues.

Dr. Nousek said that while the Roadmap is the right kind of document to use as a start, he had heard criticisms that some ideas did not receive the weight or exposure of others. In addition, the Roadmap ideas fit a narrative rather than the technology areas. It can still be a starting point, however, and he would like to see the PAGs involved as long as they are not exclusive.

Dr. Hertz confirmed that he heard Dr. Nousek advise starting with the Roadmap list, then asking the PAGs if they have ideas to remove from or add to the list. Dr. Melnick liked that idea, but cautioned that APS and the PAGs do not have the community's attention to the extent they like to believe. He suggested that Dr. Hertz also send out a community-wide email describing the importance of this work and urging interested community members to contact the PAGs in order to have more input. Dr. Hertz liked that idea. He added that he does not want APS to do the down-selection, as that is NASA's job. He wants APS to consolidate the PAG reports with comments. The PAGs report to APS.

Dr. Peterson suggested that the PAGs should each provide several pages summarizing the input they receive, followed by either a ranking of the missions by strength or a grouping of high- and low-priority missions. Dr. Kouveliotou observed that the Roadmap team was hard-pressed to find more than three to five serious contenders for the next flagship missions, and Dr. Peterson added that there are not unknown flagship missions lying around.

Dr. Hertz said that he accepted the implied request to formulate a process that incorporated the consensus of an improved way of involving the PAGs in vetting the candidates for NASA to study.

James Webb Space Telescope Exclusive Use Period Policy

Dr. Eric Smith, JWST Program Scientist, discussed the exclusive-use period for JWST data, which he identified as a science policy issue.

NASA seeks the maximum science output from its missions. The Space Telescope Science Institute (STScI) has found a positive correlation between the level of access and the amount of science that is produced. Investigators seem to think that access to data enables better proposals. It is also important to note that JWST will have a limited life.

The JWST General Observers (GOs) will be selected yearly. Current science policy states that GOs will have 12 months of exclusive-use rights to their data, and the STScI Director can recommend different lengths for this period. In July, the STScI Director recommended that the exclusive use period be set at 6 months, based on advice from the JWST Space Telescope Advisory Committee (JSTAC).

Dr. Smith wanted to apprise APS of this recommendation by JSTAC. Changing the exclusive use period would benefit both the science community and NASA. A graph showed the frequency between data availability and the proposal cycle, demonstrating that not until more than half-way through the JWST 5 year mission lifetime does all of the Cycle 1 data become available to the broad community. The timeline comparison showed that by changing the exclusive-use time, by Cycle 3 almost all of the Cycle 1 data are available, resulting in better proposals. The JWST science working group (SWG) thought this would benefit science productivity.

ESA and the Canadian Space Agency (CSA) have seen this recommendation and will talk with their communities after NASA moves forward with its discussions. NASA wants the APS members to talk with their colleagues and eventually provide guidance on this topic in order to help come to a conclusion. The goal is to have consensus by 2016, so this is the time to discuss the issue.

Dr. Stapelfeldt thought that some of the context was missing. For Spitzer, a 1-year proprietary period held for the duration. Dr. Smith said that, as with HST, the STScI Director will have discretionary time at about 10 percent, for which there will be no exclusive-use time. There has not been a determination about Legacy or Treasury proposal time. There will be early release observations as well. Perhaps up to 20 percent of the observations could be zero exclusive use in cycle 1. Dr. Stapelfeldt pointed out that new users typically need more time to analyze their data. The super-users and experienced investigators can manage 6 months, but a new person benefits from a longer time to consider their data. That has been the historical norm. Dr. Smith said that the SWG raised that issue, and found that there is not a lot of "data poaching" (i.e., people taking data other than their own from the HST archive). It is highly dependent on the field of study. Dr. Hertz added that he believes that the typical time to publish is 3 years, not 1 year, which means that the 1-year deadline does not drive when people do their analysis.

Dr. Stapelfeldt noted that this discussion addressed only GOs. The Guest Technical Observers (GTOs) will retain a 12-month period. Dr. Smith explained that the GTO period was established in 2001. GTOs need time to make sure their instruments function properly. Their time is heavily weighted to the start of the mission and is over by about the 2.5 year mark.

Dr. Sembach asked about having a default of zero exclusive-use in cycle 1 only. Dr. Smith said that the mission discussed that with the SWG, which did not see additional benefits to zero time, but saw that the penalties were greater. That led to the recommendation for 6 months. Investigators are also free to waive their exclusive use. Dr. Sembach said that an incentive to do this might be to get all of the data obtained at the same time and encourage people to work on the data set as a whole. The fact that data do not all come in at the same time is a cause of the delay of papers. Therefore, if the data can be less spread out and can be optimized, the publications can come earlier and there might be less proprietary time.

COPAG Update

Dr. Sembach listed the 10 current executive committee members, half of whom will be rotating off before next spring. Two have been asked to extend their terms in order to avoid an abrupt turnover of

such a large group. Institutional diversity has been an issue in adding new members. Dr. Sembach listed the proposed new members and described their experience.

The COPAG SAGs have been making good progress:

- SAG 6, Cosmic Origins Science Enabled by the WFIRST/AFTA Coronagraph, completed its work and had a report ready for APS approval.
- SAG 7, Cosmic Origins Science Enabled by Operations Overlap of the HST and the JWST, also completed its work and had a report ready for APS approval.
- SAG 8, Cosmic Origins Science Enabled by the WFIRST/AFTA Data Archive, is in progress, with the report expected in mid-2015.
- SAG 9, Science Enabled by Spitzer Observations Prior to JWST, was approved by APS at the August, 2014, meeting. Its report is expected in spring of 2015.

Dr. Sembach elaborated on some of the SAG activities. SAG 6 found many examples of cosmic origin science that would benefit from the coronagraph. The coronagraph would be powerful, and the SAG identified some useful features. The targets and measurements are quite valuable for cosmic origins even with less extreme contrast than what exoplanet research requires; the highest contrast is not needed for cosmic origins science. However, for some targets, such as nebulae, there is a need to repress glare. To this end, the SAG identified some narrow band filters that might be important. An integral field spectrograph would be a very powerful tool for cosmic origins studies, for example. Spectral resolution equating to a velocity of 100 km s^{-1} would be widely applicable. This should not drive the main AFTA design, however. There might also be objectives that could benefit from coronagraphic imaging, and the report includes examples.

SAG 7 addressed HST/JWST overlap. The rationale for maintaining HST operations is strong. While no compelling cases for simultaneous HST/JWST observations were submitted, this does not preclude the possibility that such cases exist. There will be some observations by Euclid and JWST in comparable timescales, which the report addresses. STScI is thinking about engaging the community in identifying JWST early release candidates; more discussion will follow. The suggestion was made for a new HST proposal category for JWST preparatory observations, and for a reciprocal HST/JWST observing agreement. There will be a call for white papers coming out about this and other ways of operating HST in its final years.

COPAG would like to start SIG 2: UV-Visible Cosmic Origins Space-Based Science and Technology Development. This will enable community discussion and operate for a longer term than a SAG, but with regular, interim reports. Dr. Sembach presented a proposed formal charter for the SIG.

Dr. Sembach asked APS to approve the new executive committee members, the new SIG, and the reports of SAG 6 and SAG 7. He noted that while approval of the executive committee members was not required, he was doing this as a courtesy. There were no objections, and Dr. Peterson said that NASA would handle the approvals.

There were no comments on the proposed SIG 2, other than Dr. Peterson saying that it was a good idea to keep UV science moving forward. The proposal for SIG 2 passed unanimously, with no objections or abstentions, and the SIG was established.

Dr. Stapelfeldt wanted to offer a correction and some additions to the report from SAG 6. The correction involved the field of view on Chart 9, in which a key piece of information was missing in regard to the

range of brightness. Dr. Sembach thanked him and said that he would pass it along. Dr. Stapelfeldt said that he would vote to approve the document if Dr. Sembach would commit to getting the comments into the report. Dr. Sembach said that he would. The report was then approved by acclamation, with no opposition or abstentions.

Dr. Kouveliotou had some questions about the SAG 7 report, specifically the Euclid precursor survey. Dr. Sembach said that while this was not his area of expertise, he understood that the survey would benefit tremendously and decouple some of the self-calibrations within the program. The report was approved by acclamation, with no opposition or abstentions.

PhysPAG Update

Dr. Nousek said that PhysPAG has worked with AAS to hold a meeting at the Seattle AAS meeting in January 2015. The X-Ray SIG and the Gamma-Ray SIG will hold open meetings at that time, and he will encourage PhysPAG members to join the COPAG and ExoPAG joint meeting with Dr. Hertz. The agenda will also address Athena, reports from the SIGs on dark energy, x-ray, gravitational waves, and other topics, and discussion of the physics of the cosmos technology priorities. No single meeting venue covers this group completely, so there will also be a mini-symposium at the Baltimore Division of Astrophysics in April. The agenda is under development, but this will be similar to last year's symposium in Savannah, Georgia.

New executive committee members for 2015 have a range of expertise. In answer to a question, Dr. Nousek said that at least one woman is among the new members.

Discussion APS members

Dr. Peterson verified that the timeline for identifying candidate flagship missions for consideration in the next DS had been decided, with the preference for the more aggressive timeline and with the proviso that the PAGs collect ideas for candidates rather than select the candidates. The PAGs should use the 30-year Roadmap as a starting point. Dr. Hertz was to propose a plan to APS, so there was no formal recommendation from APS at that time.

Dr. Scott Gaudi volunteered to write a paragraph regarding the budget questions related to the joint NASA-NSF project.

It was confirmed that a NASA-sponsored meeting at the IAU general assembly in Hawaii would not be approved, and not everyone at NASA is approved to go to the AAS meeting in Seattle. Dr. Peterson asked if there had been any effort to address the lingering travel difficulties affecting NASA employees and contractors. Dr. Hertz replied that APD had had a teleconference with the centers just the previous week, and had begun an initiative to improve the situation, including the contractor issues. He doubted that they would be able to travel as easily as before, but there was movement, especially regarding the contractors.

Dr. Peterson asked how Dr. Hertz planned to provide APS with feedback on the Subcommittee's recommendations. Dr. Hertz said that APD usually looks back at the previous recommendations before APS meetings in order to report out on them, though he did not do that this time. As meetings are being planned, he would like to know if there is a topic to revisit; reminders are welcome. APD works and acts on APS recommendations, though there might not always be a report on actions taken. He could not speak about the last NAC Science Committee meeting, however, as he was not able to attend it. He did

note that the travel situation is on agenda for the upcoming Science Committee meeting, and he will be presenting, as APD has been piloting some potential improvements.

Regarding the budgetary commitments to the exoplanet research project and the respective NASA and NSF contributions, Dr. Hertz explained that the funding is within the exoplanet exploration program and does not involve that much money. This is a continuing budget line that falls within APD's regular authority to compete science investigations. NSF will continue funding 40 percent of the WIYN operations, and APD will fund the development of the Doppler spectrograph. In Phase 2, APD will fund the people who use it to do science. He did not have any dollar amounts he could share at that point, but said that APD will work with NSF to capture and archive the data in a way that is easily accessed. The project will issue a solicitation to build the instrument in early 2015, in the form of a ROSES amendment. There will be more details at the AAS meeting.

Dr. Hertz said that he wanted to recognize and thank the APS members rotating off. They were Drs. Melnick, Stapelfeldt, and Nousek. He also thanked Dr. Peterson, whose term as Chair was coming to an end. Finally, NASA was taking suggestions for new Subcommittee members, and Dr. Hertz encouraged the current members to contact him with the names of potential candidates.

Public Comment Period

Dr. Josh Shiode from AAS asked if any FY15 funding was going to public outreach. Dr. Hasan explained that the FY15 education funds are dedicated to education only. Outreach is managed within the missions. When the missions presented their budgets, the outreach funding was programmed into their budgets. Dr. Smith added that JWST has always had public outreach separate from education. Some missions had not separated it, however, and therefore they had to reprogram in order to have outreach. Dr. Shiode said that it had not been clear whether that was happening in FY15 or FY16, and he thanked Drs. Hasan and Smith for their explanations.

Adjourn

The meeting was adjourned at 4 p.m.

Appendix A
Attendees

Subcommittee members
Bradley M. Peterson, Ohio State University*, Chair*
B. Scott Gaudi, Ohio State University, *Vice-Chair, Astrophysics Subcommittee*
Hashima Hasan, NASA, *Executive Secretary*
Nathalie Batalha, NASA Ames
James Bock, Jet Propulsion Laboratory
Neil John Cornish, Montana State University
Giovanni Fazio, Harvard Smithsonian Center for Astrophysics
Fiona Harrison, CalTech
Jason Kalirai, Space Telescope Science Institute
Chryssa Kouveliotou, Marshall Space Flight Center
Gary Melnick, Harvard University Center for Astrophysics
John Nousek, Pennsylvania State University
Kenneth Sembach, Space Telescope Science Institute
Karl Stapelfeldt, Goddard Space Flight Center
Yun Wang, University of Oklahoma

NASA attendees
Paul Hertz, NASA HQ, *Director, Astrophysics Division*
Hashima Hasan, NASA HQ, *APS Executive Secretary*
W. Vernon Jones – NASA HQ
Janet Larson – NASA HQ
Eric Smith – NASA HQ
Erin Smith – NASA HQ
Harley Thronson – GSFC

Non-NASA Attendees
Elizabeth Sheley, Zantech

Webex
Mansoor Ahmed, GSFC
Louis Barbier, Office of Chief Scientist
Dominic Benford, NASA
Matthew Bolcar, GSFC
Geoffrey Bryden, NASA JPL
Keith Chamberlain, NASA HQ
Alberto Compi, Northrup Grumman
Anne Connor, Exelis
Shawn Domagal-Goldman, NASA
Michael Fanelli, NASA
Myron Fendall, NASA Goddard
Jonathan Gardner, NASA
Jessica Glover, NASA

Grace Hu, OMB
Stefan Immleir, NASA HQ
Marybeth Kaiser, John Hopkins
Louis Kaluzienski, NASA
Lia Lapiana, NASA HQ
David Leisawitz, NASA Goddard
James Lochner, USRA
Pamela Marcum, NASA Ames
Amaya Moro, STSCI
Jon Morse, Boldly Go Institute
Guido Mueller, University of Florida
Susan Neff, NASA
Bill Oegerle, NASA
Deborah Padgett, NASA
Richard Passmore, European Space Agency
Bruce Pham, NASA
Thai Pham, NASA
Rita Sambruna, NASA
Paul Scowen, AZ State University
Joshua Shiode, AAS
Marcia Smith, Space Policy Online.com
Eric Smith, NASA
Robin Stebbins, NASA
Amy Svitak, Aviation Week Magazine
Gregory Tucker, Brown University
Alexay Vikhlinin, SAO
Glenn Wahlgren, NASA
Michael Werner, JPL
Geerasee Wijesuriya, University of Moratuwa Sri Lanka
Eric Young, Sofia

Appendix B
NAC Astrophysics Subcommittee Members

Bradley Peterson, Chair
Department of Astronomy
Ohio State University

Hashima Hasan, Executive Secretary
Astrophysics Division
Science Mission Directorate
NASA Headquarters

James J. Bock
Jet Propulsion Laboratory

Joel Bregman
Department of Astronomy
University of Michigan

Neil John Cornish
Department of Physics
Montana State University

Julianne Dalcanton
Professor of Astronomy
University of Washington

Giovanni Fazio
Harvard Smithsonian Center for Astrophysics

B. Scott Gaudi
Department of Astronomy
Ohio State University

Fiona Harrison
Professor, Physics and Astronomy
CalTech

Jason Kalirai
Space Telescope Science Institute

Chryssa Kouveliotou
Marshall Space Flight Center

Gary Melnick
Senior Astronomer
Harvard University

John A. Nousek
Professor of Astronomy & Astrophysics
Pennsylvania State University

Kenneth Sembach
Space Telescope Science Institute

Rachel Somerville
Department of Physics and Astronomy
Rutgers University

Karl Stapelfeldt
Goddard Space Flight Center

Yun Wang
Department of Physics and Astronomy
University of Oklahoma

Appendix C
Presentations

1. *Astrophysics Division Program Update*, Paul Hertz
2. *Update to the NASA Astrophysics Implementation Plan*, Rita Sambruna
3. *General Observers Exclusive Use Period Policy*, Eric P. Smith
4. *Cosmic Origins Program Analysis Group*, Kenneth Sembach
5. *Physics of the Cosmos Program Analysis Group,* Johm Nousek

Agenda
Astrophysics Subcommittee
November 14, 2014
Telecon – Time EST

Friday 14 November

11:00 a.m.	Introduction and Announcements	Brad Peterson
11:10 a.m.	Astrophysics Division Update	Paul Hertz
1:10 p.m.	Astrophysics Implementation Plan	Rita Sambruna
2:00 p.m.	Break	
2:15 p.m.	James Webb Space Telescope Exclusive Use Period Policy	Eric Smith
2: 45 p.m.	COPAG Update	Ken Sembach
3:15 p.m.	PhysPAG Update	John Nousek
3:30 p.m.	Discussion	APS members
4:00 p.m.	Public Comment Period	
4:05 p.m.	Recommendations, Actions	Brad Peterson
4:30 p.m.	Brief to Hertz	Brad Peterson
5:00 p.m.	Adjourn	