

28 August 2014

Dr. David J. McComas
Chair, NASA Advisory Council Science Committee
Southwest Research Institute

Dear Dave,

The NASA Advisory Council's Astrophysics Subcommittee (APS) met at NASA Headquarters on 11-12 August 2014. All members of the APS were present: APS membership is currently comprised of Natalie Batalha, Jamie Bock, Joel Bregman, Neil Cornish, Julianne Dalcanton, Giovanni Fazio, Scott Gaudi (APS Vice Chair), Fiona Harrison, Jason Kalirai, Chryssa Kouveliotou, Gary Melnick, John Nousek, Bradley Peterson (APS Chair), Ken Sembach, Rachel Somerville, Karl Stapelfeldt, and Yun Wang. Also in attendance were Paul Hertz (Director, NASA Astrophysics Division) and Hashima Hasan (APS Executive Secretary). APS Chair Bradley Peterson missed the second day of the meeting due to a sudden illness so APS Vice Chair Scott Gaudi chaired the second day of the meeting.

Paul Hertz presented an update on the Astrophysics Division (ApD). Linda Sparke gave an update on the R&A program with the aim of helping the APS try to understand the recent decrease in the fraction of proposals that NASA has been able to fund through this program. Paul Hertz also briefed us on planning for the mid-decadal review, and Kristen Erickson brought us up to date on the reorganization of SMD Communications and Education. The three program analysis groups reported on their activities, as we will describe below. We also heard status reports on the *James Webb Space Telescope (JWST)* from Eric Smith and the *Stratospheric Observatory for Infrared Astronomy (SOFIA)* from Pamela Marcum. Amber Straughn updated us on plans for observing the 25th anniversary of the launch of *Hubble Space Telescope*. Other discussions included the *Planck* and *Spitzer* missions post-Senior Review. We also had an in-depth discussion about current NASA travel policies and their impact. We were pleased to have William Oegerle (Director, Astrophysics Science Division, NASA GSFC) and Belinda Wilkes (Director, *Chandra X-Ray Observatory*, Harvard-Smithsonian Center for Astrophysics) participate in this discussion. The APS would like to thank all of the presenters and participants for their time and effort.

The APS also assembled material for NASA's 2014 response to the Government Performance and Results Act – Modernization Act (GPRAMA). We are pleased to report that the APS rated the ApD performance as “green” in all three areas of endeavor.

John Nousek reported on the activities of the Physics of the Cosmos Program Analysis Group (PhysPAG). The PhysPAG received a whitepaper prepared by the Inflation Probe Science Interest Group (IPSIG) that explained the significance of the recent *BICEP2* measurement of polarization in the Cosmic Microwave Background, and provided an overview of current NASA and worldwide plans for moving forward in this area. The APS accepted this white paper and commends the IPSIG for its work.

The PhysPAG and the APS are greatly pleased and commend the ApD for successfully negotiating with ESA and JAXA to create a Science Study Team for the joint *Athena* mission. Inclusion of one US (non-NASA) scientist with eight ESA scientists and one JAXA scientist is an appropriate representation (within the constraints of the projected relative involvements) and assures that US community input will

be strong and present from the beginning of the *Athena* mission development. The NASA ex officio members, from both the US *Athena* project and NASA Headquarters, are well chosen and promise a close liaison to critical funding and decision making among ESA, JAXA, and NASA SMD.

Ken Sembach presented a status of the Cosmic Origins Program Analysis Group (COPAG) activities since the last APS meeting. Science Analysis Group activities are ongoing, and reports will be presented at the next APS meeting in the fall of 2014. A successful workshop at Goddard Space Flight Center in May 2014 kicked off activities of the newly formed Far-Infrared Science Interest Group. A new Science Analysis Group (SAG) to study *JWST* science enabled by dedicated *Spitzer Space Telescope* observing campaigns in the next few years was given approval to start. The COPAG will coordinate that new effort with the *Spitzer* Users Group and the *JWST* Science Working Group.

Scott Gaudi reported on the activities of the Exoplanet Program Analysis Group (ExoPAG) since the last APS meeting, including a summary of the ExoPAG 10 meeting in June in Boston, and the ongoing activities of the SAGs. The APS received the final report of SAG 11 “Preparing for the WFIRST Microlensing Survey,” which identifies observational and theoretical programs that will enhance the *Wide-Field Infrared Survey Telescope (WFIRST)* microlensing survey science and reduce the mission's scientific risk. The APS accepted this final report and commends the SAG members for their work. The APS also approved the creation of a new SAG (SAG 12) entitled “Scientific potential and feasibility of high-precision astrometry for exoplanet detection and characterization.”

Two issues have arisen in the wake of the 2014 Senior Review, whose recommendations became public since the last APS meeting in March. Both issues stem from a decrease in available funding between the Senior Review and ApD's implementation of their recommendations. First, it initially appeared that funds would not be available to continue the *Spitzer* warm mission. The APS strongly supports the continuation of the *Spitzer* mission on the basis of its unique capabilities for exoplanet science and cosmological surveys to prepare for *JWST*. We commend the NASA Science Mission Directorate for its extra efforts to find funds to continue the *Spitzer* warm mission and look forward to another two years of *Spitzer* science operations.

Second, the APS received a letter of concern from the PhysPAG about the amount of funding provided to the *Planck* mission for final calibration as a result of the 2014 Senior Review. The PhysPAG is concerned that the funding might be insufficient to allow the team to properly complete the final 2015 data release approved by ESA. The letter notes that *Planck* data will be the foundation for all cosmology in the coming decade: *Planck* will be the definitive reference for CMB measurements, the basis for future missions such as *Euclid* and *WFIRST*, and the scientific planning for the future Inflation Probe. The APS notes the strong supporting statements in the Senior Review's assessment, that “the mission's findings may well become one of the great landmarks in human history,” and “it is essential to provide the critically required funding to enable *Planck* to assure an orderly completion of its work. Even with current budgetary constraints on NASA's astrophysics program it is important to recognize the unique significance of this mission and to ensure the most accurate final results.”

Recommendation: The APS is reluctant to revisit the conclusions of the Senior Review or act as an avenue for appeals of decisions made by the ApD in response to the Senior Review. However, the members recognize the importance of the unique US role in the final 2015 release, and the worrisome fact that when the team disbands it will be practically impossible to revisit any uncompleted work at a later date. The APS believes that the *Planck* proposal should be evaluated by an external team of experts who can credibly consider the merits of increased support for the final *Planck* data products, looking at the cost to benefit ratio for improving the calibration and treatment of systematic errors to relate the projected improvements to the needs of the *WFIRST*, *Euclid*, and Inflation Probe science goals, and provide useful advice to the ApD. The APS strongly recommends that any additional funding potentially allocated to the

Planck team by SMD (ApD) does not result in further cuts to any of the missions evaluated by the Senior Review.

The APS notes that similar concerns apply to the completion of data processing for the extended phase of the *WISE* mission (*MaxWISE*).

The APS continues to monitor with interest the science output of *SOFIA*. A report on *SOFIA* was issued by the Office of the Inspector General (OIG) on 9 July (IG-14-022). The report includes the SMD response to the OIG recommendations. The APS endorses the ApD goal of defining suitable performance metrics for *SOFIA* based on scientific productivity rather than flight hours and assessing the science value of the mission versus operational costs. We look forward to regular reports on the status of *SOFIA* and on progress toward implementing the recommendations of the OIG.

The APS has also expressed concern over the decrease in the fraction of R&A proposals that NASA SMD is able to fund. The NSF has had a similar problem and is currently considering possible remedies. The APS thanks Paul Hertz and his staff for presenting the historical trend data on mission General Observer funding to the community. The data show a substantial drop in mission-sponsored grant funding between 2008 and 2011, coincident with the end of the *Spitzer* cryogenic mission. This ~\$30 M drop was partially offset by a ~\$15M increase in overall R&A funding over the same period (in response to the Astro 2010 recommendation). Nevertheless, it is clear that the reduction in mission-sponsored grant funding has played a role in the increased R&A proposal pressure over the past five years. The APS understands that the Astronomy and Astrophysics Advisory Committee (AAAC) is also looking at this matter in some depth, and APS will reconsider this general issue when the AAAC report becomes available.

Recommendation: In the meantime, the APS discourages undertaking any measures to artificially increase the proposal acceptance rate (say, by restricting investigators to one proposal per opportunity) until the causes and possible consequences of remedies are more thoroughly understood.

The APS also discussed the negative effects of current NASA conference policies on the worldwide NASA presence and scientific prestige. The APS recognizes the need to manage conference-related spending; however, given these adverse effects on the scientific community, APS urges NASA to implement a more uniform and streamlined process for conference approval and conference travel within the spending approval and reporting caps. Under the current structure, conference attendees are often asked to provide travel information with very short turnaround times (i.e., a few days), and notifications of approval/rejection are provided 30 or less days prior to the conference start date. This practice results in lost opportunities from schedule constraints and increased costs due to late registration fees and limited hotel and flight options. As a result, the ability of NASA's scientists to disseminate their and NASA mission results are severely limited, impacting their productivity and resulting in a less efficient use of spending NASA travel funds. Further, in the long term, the current policy threatens NASA's scientific leadership and international reputation.

Recommendations: To ameliorate this situation, APS offers the following suggestions, which are consistent with the Administration's guidelines to reduce NASA travel spending:

- To the fullest possible extent, let the NASA centers and contractors make decisions about which individuals should attend a particular conference, rather than requiring names and exhibits that require separate approval. Let the decisions based on scientific merit occur at a lower, more appropriate level.
- Move up approvals from HQ and centers to 3-4 months before a conference for attendance and one year for holding a conference.

- Reconsider the self-imposed rule including contractor attendance at foreign conferences within the limit of 50 NASA employees. NASA should aim for a healthy balance between civil servant and contractor attendees at foreign science conferences.

We would be pleased to respond to any requests for clarification or elaboration by the NAC Science Committee.

Finally, our overarching concern remains the precarious state of space astrophysics in the United States. To quote from the 2014 Senior Review:

“The operation of the nation’s space borne observatories is so severely impacted by the current funding climate in Washington that the SRP feels that American pre-eminence in the study of the Universe from space is threatened to the point of irreparable damage if additional funds cannot be found to fill the projected funding gaps.”

Sincerely yours.



Bradley M. Peterson
APS Chair



B. Scott Gaudi
APS Vice Chair