# NASA ADVISORY COUNCIL

# ASTROPHYSICS SUBCOMMITTEE

November 21, 2011

Teleconference

MEETING MINUTES

Alan Boss, Chair

Rita Sambruna, Executive Secretary

APS November 21 2011 Teleconference

Introductions

Dr. Alan Boss, Astrophysics Subcommittee (APS) Chair, opened the meeting with a roll call of the APS membership and conflict of interests. There were no conflicts of interest.

Update: ESA-NASA Discussion on Euclid

Mr. Geoff Yoder, Acting Director of NASA's Astrophysics Division (APD) and APD Deputy Director, described the results of his recent discussions with the European Space Agency (ESA) regarding U.S. participation in ESA's Euclid mission. Mr. Yoder had previously explained that ESA had placed limitations on U.S. involvement in the program. Euclid is rapidly moving into implementation, and the project goals and architecture are set. ESA must finalize costs in the June 2012 timeframe in order to move forward with the launch date of 2019. Partnership between ESA and NASA is still possible as long as the Euclid mission profile remains unchanged.

At Mr. Yoder's meeting with ESA representatives, the specific items discussed as possible NASA contributions included the focal plane, reaction wheels, detectors, non-hardware contributions such as the Euclid Science Ground Segment (e.g., a data centre, data processing), back-up ground stations, and filter wheels. It is also possible that NASA could help drive the science requirements on an additional year (Year 6) of the Euclid mission, currently planned to last 5-years, provided that there is similar availability of WFIRST to ESA. The level of the U.S. contribution will be less than the maximum of 20 percent previously discussed over the last year. ESA has requested NASA to provide a Letter of Intent noting the proposed approach in December 2011, with a signed Memorandum of Understanding (MOU) through the U.S. State Department by April 2012.

At this point, ESA does not want to discuss topics like data processing and non-hardware elements, though these could be areas for partnership discussions once Euclid is further along. As a condition for enabling such discussions, ESA requires that a partnership include a hardware contribution of the magnitude of detectors, or filter wheels, or reaction wheels. The hardware contribution will allow NASA some degree of inclusion during the limited access period. If, for example, NASA contributes detectors, ESA will allocate NASA a slot on the Euclid science team and prorated access to the early science at about the 10 percent level.

Mr. Yoder emphasized that should NASA contribute the hardware under discussion, ESA will consider a hardware contribution of comparable magnitude on WFIRST. The hardware contribution would also open up discussions several years from now on items such as data processing or the data pipeline. The same applies to steering some of the science in Year 6 – it is contingent upon NASA providing a minimal hardware contribution up front. Should Euclid continue beyond 5 years, ESA would be open to discussing this option in exchange for the same amount of time given to ESA to drive some of the WFIRST science. For this type of discussion to work, the Euclid and WFIRST missions will have to overlap at some point in time. ESA does not want a gap between the two.

Mr. Yoder reiterated that a minimum contribution of a reaction wheel, detector, or filter gives NASA a slot on science team. ESA would then look at making a comparable contribution on WFIRST, and be open to additional discussions of exchanging data between the two projects. Note that the proposed NASA hardware contribution would enable future discussions but a potential NASA hardware contribution is not dependent on an ESA potential contribution to WFIRST. These discussions would happen at a later time, not now. The overlap of the missions is necessary if NASA is to provide science direction for Year 6 of Euclid.

The approach Mr. Yoder would like to present to the National Research Council (NRC) ad hoc task group is a minimal hardware investment of reaction wheels or detectors in exchange for a US member being included on the science team, which includes a total of 12 positions, and prorated access to early science of about 10 percent. This would enable any of the other discussions mentioned. Limited access would allow a team led by a principal investigator (PI) to have access to the best of the data before it is made available to the public. NASA would have to create that PI-led team after the MOU goes through. This approach would assure U.S. scientists limited early access to dark energy information while NASA continues developing WFIRST. Typically, data are made public for non-participants 1 year after they are received.

Regarding the likely scale of this contribution financially and what might not get done as a result of funds shifted to Euclid, Mr. Yoder suggested that the dollar range is $15-20 million. While he cannot comment on which activities might not be funded before the FY13 budget is released, he said that the approximate $5 million per year would fall into budget optimization and not make a substantial difference in APD operations.

As for determining what might happen with Year 6 of Euclid and the overlap with the WFIRST mission, both projects will be far enough along to know what is happening by time those discussions become relevant. Part of the motivation for discussing reaction wheels was to ascertain whether Euclid could benefit from quieter reaction wheels than currently proposed thus providing more science observation time during the five year mission.
In answer to a question about the possibility of providing both detectors and reaction wheels, Mr. Yoder said that that was indeed possible, but it would have a negative effect on the available APD budget without adding another NASA representative to the Euclid science team. In addition to the projected $20 million spent on hardware, NASA will have to fund the PI-led team.

Committee on Astronomy and Astrophysics (CAA) Update

Dr. Marc Allen, of NASA HQ, described the history of CAA, explaining that it was disbanded after the release of the Decadal Survey (DS) and is now being reconstituted, in part to consider the issue of NASA's participation in Euclid. NRC attorneys have determined that standing committees cannot give advice, and therefore an ad hoc task group is being created for this purpose, as ESA requires a rapid response on Euclid. The goal is to create the ad hoc group in time to obtain input by the end of January 2012.

In answer to a question, Mr. Yoder said that the path forward that the NASA will take, contingent on the President's budget and the ad hoc committee findings, will be reflected in the letter due to ESA by December 2011

Future Directions for the WFIRST Science Definition Team (SDT)

Mr. Yoder explained that the SDT activities were briefly suspending after the midterm report was presented in July pending the discussions about Euclid. New directions will be forthcoming. So far the SDT has worked on how to improve the WFIRST performance and reduce costs, if possible, in light of the Euclid mission. Mr. Yoder would like to accelerate the SDT timeframe for delivering their final report to NASA from December 2012 to July 2012.

In answer to a question about having SDT consider lower-cost versions of a mission that could fill the Decadal Survey science goals in combination with Euclid, Mr. Yoder replied that the United States must maintain a leadership role in science, and he is not sure the SDT is the source to address the question. Dr. Allen added that the charge to the ad hoc group is limited at this time. There could be other topics in future, however.

In answer to a question Mr. Yoder noted that ESA is approaching other potential partners. For example, ESA could obtain the detectors from NASA's vendors through ESA consortium members. APS member Dr. Gary Bernstein cautioned Mr. Yoder that in the past, ESA has restricted limited partners from having access to certain types of science and information, so it is important to be clear about this in any agreement. Mr. Yoder replied that his meeting with ESA covered this issue, and he was assured that ESA would not withhold access to any areas. ESA is mostly concerned about first authorship of papers.

Mr. Yoder was asked if other tangible hardware contributions from other U.S. entities, such as the Department of Energy (DOE) were possible. He replied that there is DOE activity in the consortium, but no hardware is involved. Other hardware partnerships with U.S. entities would be subject to open competition.

Public Question and Answer

Dr. Boss asked for comments from members of the public.

Dr. Don Figer of the Rochester Institute of Technology asked if NASA plans to issue a Purchase Order (PO) to a vendor, who would then ship the hardware to ESA. Mr. Yoder said that NASA will want to test any hardware in order to ensure that it meets the Agency's objectives. Whether that will mean testing at a center or elsewhere depends on additional negotiations with the vendor.

Dr. Michael Werner of NASA Jet Propulsion Laboratory (JPL) asked about the scope of the activity of the ad hoc committee, and whether the committee will make recommendations or comment on the overall approach. Dr. Allen said that the focus will be on how this mission fits into the larger picture delineated by the last DS and whether the astronomy community, as represented by NRC, is satisfied that this is a viable action within the larger context. Mr. Yoder added that the environment has changed since the DS was issued, in part because Euclid was not yet selected at that time. In light of new events, it is necessary to determine whether the partnership with Euclid is consistent with the overarching DS goals.

Summary and Adjourn

Dr. Boss stated that APS had an implicit action item to provide Mr. Yoder with their comments on his proposal. This proposal is for NASA to make a minimal hardware contribution to Euclid in exchange for roughly 10 percent access, taking into consideration the caveats of the NRC ad hoc task force. Dr. Boss called on each APS member participating in the teleconference to provide an opinion as to whether this action is a wise one.

Drs. Boss, Arjun Dey, Sara Heap, John Hughes, James Kasting, Edna DeVore, and Gabriela Gonzalez approved of Mr. Yoder's plan without further comment. Dr. Chris Martin also supported it, adding that serious thought should be given to making the detector contribution. Dr. Vicky Kalogera agreed, adding that NASA should make the minimum contribution necessary to get a seat at the table, given other budget constraints. Dr. Mary Elizabeth Kaiser approved the plan and supported Dr. Kalogera's advice, stating that NASA should make the minimal financial contribution possible and apply any remaining funds to developing WFIRST. She suggested that NASA also determine the best option for increasing the science output.

Dr. Steven Ritz thought the previous suggestions were advisable and recommended that emphasis be placed on maximizing the scientific impact. He also suggested that Mr. Yoder consider the entire astrophysics program in light of the budget. Dr. Bernstein approved of the proposal and thought that, of the options discussed, the reaction wheels would do the most to improve the science performance of the mission. Dr. Terry Oswalt expressed some disappointment that NASA will not participate at the 20 percent level, but thought the proposal represented good value for the dollar. He would like to see NASA contribute the reaction wheels. Dr. Paul Ray also considered the proposal worthwhile, and added that he hopes this will help improve NASA's credibility with ESA.

Dr. Heap noted that while she agrees with Dr. Martin's preference for the detectors, she would like to see NASA involved in the filter wheels. Anything NASA could learn in prelaunch testing will benefit the Agency in the future, and both of those items will be required in WFIRST. Mr. Yoder explained that ESA's order of preference for NASA's contribution is detectors, reaction wheels, and filter wheels. This is up for negotiation, however, and he hopes NASA will be allowed some flexibility.

Dr. Boss adjourned the meeting at 4:15 p.m.

## Appendix A
## Participants

Subcommittee members
*Alan Boss,* Carnegie Institution, *Chair Astrophysics Subcommittee*
Rita Sambruna, NASA HQ, *Executive Secretary*
Gary Bernstein, University of Pennsylvania
Edna DeVore, SETI Institute
Arjun Dey, NOAO
Gabriela Gonzalez, Louisiana State University
Sara Heap, GSFC
John Hughes, Rutgers University
Mary Elizabeth Kaiser, The Johns Hopkins University
Vicky Kalogera, Northwestern University
James Kasting, Pennsylvania State University
Chris Martin, California Institute of Technology
Terry Oswalt, Florida Institute of Technology
Paul Ray, Naval Research Laboratory
Steven Ritz, University of California Santa Cruz

NASA participants
Jaya Bajpayee, NASA/HQ
Richard Barry, NASA/GSFC
Richard Capps, NASA/JPL
Joan Centrella, NASA/GSFC
Gerard Daelemans, NASA/GSFC
Michael Devirian, NASA/JPL
Neil Gehrels, NASA/GSFC
Kevin Grady, NASA/GSFC
Richard Griffiths , NASA HQ
Illana Harrus, NASA HQ
Hashima Hasan, NASA HQ
Doug Hudgins, NASA HQ
Louis Kaluzienski, NASA HQ
Chryssa Kouveliotou, NASA/MSFC
Thierry Lanz, NASA HQ
James Marr, NASA/JPL
Marian Norris, NASA HQ
Bill Oegerle, NASA/GSFC
Ben Parvin, NASA/JPL
Cathy Peddie, NASA/GSFC
Trent Perrotto, NASA HQ
Wilton Sanders, NASA HQ
Daniel Stern, NASA/JPL
Jackie Townsend, NASA/GSFC
Stephen Unwin, NASA/JPL
Michael Werner, NASA/JPL

Geoff Yoder, NASA Science Mission Directorate, *Acting Director, Astrophysics Division*

Other participants
Yudhijit Bhattacharjee, Science Magazine
Roger Blandford, Stanford University
Adam Burrows, Princeton University
Anne Connor, House Science, Space, and Technology Committee
Randall R. Correll, Ball Aerospace
Monty DiBiasi, Southwest Research Institute
Andreas Diekman, European Space Agency
Richard Dissly, Ball Aerospace
Fabio Favato, European Space Agency
Don Figer, RIT
Christopher Hirata, CalTech
Charles Kennel, University of California, San Diego
David Lang, NRC
Dan Lester, University of Texas
Michael Levi, Lawrence Berkeley Lab
Charles Lillie, Northrup Grumman
Michael Moloney, NRC
Jon Morse, Rensselaer Polytechnic Institute
Paul Schechter, MIT
Ronald Shapiro, National Academy of Sciences
Elizabeth Sheley, Zantech
Marcia Smith, spacepolicyonline.com
Pamela Whitney, House Committee on Science, Space, and Technology

## Appendix B
## NAC Astrophysics Subcommittee Members

**Alan P. Boss,** Chair
Carnegie Institution for Science
Department of Terrestrial Magnetism

**Rita Sambruna**, Executive Secretary
Astrophysics Division
Science Mission Directorate
NASA Headquarters

Louis J. Allamandola
NASA Ames Research Center

Gary M. Bernstein
Professor of Physics and Astronomy
University of Pennsylvania

Edna DeVore
Director of Education and Outreach; Deputy CEO
SETI Institute

Arjun Dey
Associate Astronomer
National Optical Astronomy Observatory

Gabriela Gonzalez
Professor, Physics and Astronomy
Louisiana State University

Shaul Hanany
School of Physics and Astronomy
University of Minnesota/Twin Cities

Sara R. Heap
ExoPlanets and Stellar Astrophysics Laboratory
Goddard Space Flight Center
National Aeronautics and Space Administration

John (Jack) P. Hughes
Department of Physics and Astronomy
Rutgers University

Mary Elizabeth Kaiser
Principal Research Scientist
Department of Physics and Astronomy

The Johns Hopkins University

Vicky Kalogera
E.O. Haven Professor of Physics & Astronomy
Northwestern University

James F. Kasting
Distinguished Professor
The Pennsylvania State University

Chris Martin
California Institute of Technology

Terry Oswalt
Professor and Head
Department of Physics and Space Sciences
Florida Institute of Technology

Paul S. Ray
Naval Research Laboratory

Steven Ritz
Santa Cruz Institute for Particle Physics
University of California

## Appendix C
## Agenda

### Astrophysics Subcommittee
### November 21, 2011
### Via telecon/webex (Eastern Standard Time)

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|---|---|---|
| 3:00-3:05 | Introduction, Announcements | A. Boss |
| 3:05-3:35 | Update: ESA-NASA discussion on Euclid | G. Yoder |
| 3:35-3:50 | CAA update | M. Allen/G. Yoder |
| 3:50-4:00 | Future directions for WFIRST SDT | G. Yoder |
| 4:00-4:15 | Q&A | Committee members |
| 4:15-4:25 | Open to Public for Q&A | |
| 4:25-4:30 | Summary and Adjourn | A. Boss |