Dear Dr. Charles Kennel:

I am writing to report on the meeting of the Astrophysics Subcommittee of the NAC. The Astrophysics Subcommittee met at the University of Maryland, College Park on 3-4 May, 2006. During our meeting, we were addressed by Senator Schmitt, Administrator Griffin, Associate Administrator Cleave, Rick Howard (the current Acting Director of the Astrophysics Division) and Len Fisk, chairman of the NAS Space Studies Board.

We are pleased that NASA has reinstituted the advisory structure. The advisory system enables communication between the community and NASA by providing a mechanism for NASA to obtain scientific input from the community and by facilitating feedback from NASA to the community.

Astrophysics is at a critical juncture. The past decade has been a very exciting time in astrophysics with NASA satellites producing exciting results in fields ranging from extrasolar planets to black holes to cosmology. With over a dozen astrophysics missions in operation, NASA has a strong intellectually diverse program that not only is producing important scientific results, but is also captivating the general public.

Yet the Subcommittee fears that we face scientifically leaner times in the coming decade. As the SSB has noted in its recent report, NASA lacks the funds needed to carry out its plans and this has led to significant delays and mission cancellations. Within astrophysics, the confluence of three different events has produced a very tight budget: (1) the loss of the shuttle has delayed HST SM4 for over five years and the astrophysics division has born, directly and indirectly, many of the associated costs associated with the delay and the disruptions associated with the decision to proceed with and then cancel a robotic mission; (2) cost growth in several projects has strained the budget; and (3) on top of the cuts made to the 2006 and 2007 budgets, the planned astrophysics budget is declining from more than $1.5 Billion in 2006 to $1.3 Billion in 2009 – 2011, a 25% reduction in real dollars. These budget pressures have led to significant delays in SIM, TPF and the whole Beyond Einstein programs, as well as cuts in the R&A program and cancellations in the Explorer program. The JWST budget is also expected to experience growth in the budget out-years, both due to project cost growth and due to factors outside the purview of the project (e.g., NASA's delay in selecting the Ariane as the launch vehicle), exacerbating an already difficult situation. Under NASA's current plans, there will be only a handful of operating missions by the middle of next decade.

During our meeting, we discussed our view of the priorities and principles for science planning. The Subcommittee reaffirmed the importance of the decadal survey planning process in providing strategic vision for the agency and the field. To maintain US leadership in astrophysics, we must continue to invest in the future by training students and developing novel technologies. Astrophysics is a broad field, continually pushing against the bounds of our capabilities both intellectually and technologically. A mix of large missions, small missions, and research is most effective at facilitating advances. As well as addressing critically important questions of their own, the latter two provide the trained workforce and technological advances needed to facilitate the former.

Our strongest overall recommendation is an endorsement of the NRC recommendation that NASA, particularly the Science Mission Directorate, needs additional funds if it is to carry out its planned missions. Such cuts would imperil our world leadership role in space science.

The Subcommittee also has a number of other (unranked) recommendations for the Astrophysics Division:

- The Subcommittee recommends that NASA work to restore the Explorer program. The Subcommittee was very concerned about the dramatic cutbacks in the Explorer program. With low-cost scientifically effective missions such as GALEX, WMAP and SWIFT, the Explorer program provides frequent access to space and the opportunity to address scientific problems that are not well suited to the flagship missions. In the past decade, an Explorer was selected nearly every year. Since 2002, there have been only two Explorers selected in astrophysics: NuSTAR and WISE and there is no prospect of a new Announcement of Opportunity before 2008. Despite excellent performance during phase A, NuSTAR, the first high-energy X-ray imaging mission, was recently cancelled due to lack of funds and the WISE mission is facing significant delays because of budgetary cutbacks.
- The Subcommittee recommends that NASA provide sufficient technology development funds for the CON-X, LISA and TPF missions. These projects have experienced draconian cuts in the middle of the 2006 budget year. Dramatic cuts in technology funding lead to loss of critical expertise, not only raising the overall costs of these missions but also threatening their survival. The next decadal survey will likely rank these missions as major priorities and it is important for their technological development to be sufficiently far advanced to facilitate a full evaluation in the decadal review, including realistic cost evaluations.
- The Subcommittee recommends that NASA maintain a healthy R&A program. The R&A program both provides the seed corn for future missions and enables scientists to fully harvest the scientific yield from on-going and past missions. The technology development done under the R&A program is essential to the success of future missions, to lowering their costs, minimizing their risks, and maximizing NASA's science return per dollar from its large missions.

The recent review of the SOFIA project was not available to the Subcommittee at the time of the meeting. Because the Subcommittee was not briefed on the SOFIA review and project, we do not evaluate the mission in this letter, nevertheless, the Subcommittee is concerned about the cancellation of the mission and plans to address this issue at a future meeting.

The Astrophysics Subcommittee is planning to meet again on July 6-7 and September 14-15. We are eager to have the NAC and its Science Committee identify areas where we

can provide useful input in advance of these meetings, and we strongly encourage members of the astrophysics community to contact us with their concerns.

Sincerely yours,

David Spergel for the Astrophysics Subcommittee