



Particle Astrophysics Scientific Assessment Group (PASAG) Charge

HEPAP Meeting

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Introduction

The scientific opportunities for the U.S. particle physics program have been most recently identified and articulated by the Particle Physics Project Prioritization Panel (P5) report submitted in May 2008.

At this time, we would like to explore in further detail the opportunities and scientific challenges available at the Cosmic Frontier.

We are requesting that HEPAP initiate a Particle Astrophysics Scientific Assessment Group (PASAG) to address these questions.

We request that the PASAG re-examine current and proposed U.S. research capabilities in particle astrophysics

- assess their role and potential for scientific advancement, and
- determine the time and resources (the operations costs, facilities, personnel, research and development and capital investments) needed to achieve an optimum program in the context of various budgetary scenarios indicated below.
- PASAG should then
 - identify and evaluate the scientific opportunities and options
 - that can be pursued at these different funding levels
 - for mounting a world-class program
 - that addresses the highest priority science in particle astrophysics.

Scope

The scientific scope of this review should be limited:

- **to opportunities that will advance our understanding of the fundamental properties of particles and forces using observations of phenomena from astrophysical sources.**

We consider the following scientific areas to be within the scope of this study:

- **Exploring the particle nature of dark matter**
- **Understanding the fundamental properties of dark energy, and**
- **Measuring the properties of astrophysically generated particles (including cosmic rays, gamma rays, and neutrinos)**

Some of these areas have been previously studied in detail by other ad hoc panels and advisory groups and the PASAG should make use of this existing body of work.

Some of the research areas identified above will be within the scope of the National Research Council's Astronomy and Astrophysics Decadal Survey (Astro2010) and the Organization for Economic Cooperation and Development (OECD) Global Science Forum's Working Group on Astroparticle Physics. An appropriate sharing of information should be explored.

These evaluations should be done in the context of the increasing internationalization of particle astrophysics, while recognizing the need to maintain a healthy, flexible, domestic research infrastructure, and respecting the funding agencies' different but complementary scientific missions and the varied ways they intersect with this research.

Funding Profiles

Your report should provide recommendations on the priorities for an optimized particle astrophysics program over the next ten years (FY 2010-2019), under the following four funding profile scenarios:

- **Constant effort at the FY 2008 funding level (i.e., funding in FY 2010 at the level provided by the FY 2008 Omnibus Bill, inflated by 3.5% per year and continuing at this rate in the out-years)**
- **Constant effort at the FY 2009 President's Request level (i.e., funding in FY 2010 at the level provided by the FY 2009 Request, inflated by 3.5% and continuing at this rate in the out-years).**
- **Doubling of funding over a ten year period starting in FY 2009 (i.e., funding in FY 2010 at the level provided by the FY 2009 President's Request, inflated by 6.5%, and continuing at this rate in the out-years)**
- **Additional funding above funding scenario 3, in priority order, associated with specific activities needed to mount a leadership program that addresses the scientific opportunities identified in the EPP2010 or P5 reports.**

Details of current funding for particle astrophysics, outyear planning, operations costs and project profiles will be provided to the PASAG by the agencies.

Further Guidance

The report should discuss the facilities and instrumentation that can be used to carry out the current program

- as well as new facilities -- including dedicated research centers, as appropriate –
- and instrumentation that will need to be developed by the DOE and NSF
- in order to mount a productive, forefront program for each of the funding scenarios.

The report should articulate the scientific opportunities that can and cannot be pursued and the impacts on training of physicists as well as the broader scientific community under each of the funding profile scenarios.

Continued operations of existing facilities will have to be balanced against the opportunities to develop new or upgraded facilities with advanced capabilities.

The report should also provide a detailed perspective on how the pursuit of possible major initiatives would complement the program you recommend in each of the scenarios.

We would appreciate the committee's preliminary comments by July 1, 2009 and a final report by August 15, 2009.

We understand this is a difficult task; however, your considerations on these issues will provide essential input for both the DOE and NSF planning.