

## Astrophysics Newsletter Fall 2004

The 2005 April Meeting of the American Physical Society will be held 16—19 April at the Marriott Waterside Hotel in Tampa, on the west coast of Florida. The scientific program will include three plenary sessions, approximately 75 invited and focus sessions, and more than 100 contributed oral and poster sessions. Astrophysics will be well represented in each category. A summary of invited sessions sponsored by DAP is provided below. DAP will host a wine and cheese reception at our business meeting.

From the Chair

Steve Holt

Thanks to all of you who sent me messages about your ideas about the future of the Division of Astrophysics. I'll be drafting a summary of those messages to send to the Executive Committee for a discussion at the April meeting in Tampa.

Very briefly, the general consensus seems to be that our unique role should be as the connection between astrophysics and the general physics community. Toward that end, our annual April meeting should not be as discipline-specific as are typical AAS/HEAD meetings, for example. Instead, we should concentrate on advertising the excitement of astrophysics to both other physicists and, especially, to students. Additionally, there seems to be a strong feeling that DAP meetings should be the venue of choice for the annual meetings of some specific sub-disciplines (e.g., cosmology, gravitational waves, gamma-ray astrophysics). It's not too late to send me any more ideas that you may have on this subject.

Consistent with the recommendations from the DAP membership, some specific actions have occurred since the last April meeting. We are actively contacting all the Physics Departments and Society of Physics Students chapters in Florida to advertise the inexpensive student registration fee (\$50, including APS membership) at the April 2005 meeting in Tampa. We're also suggesting to them that many of our invited sessions (and the plenary sessions) are extremely student-friendly in the sense that they are not pitched to discipline experts. We expect to continue this simple outreach to "local" students at subsequent April meetings.

You may remember that the April 2006 meeting in Dallas was meant to include a joint DAP/HEAD meeting. Although many of the individuals on both the DAP and HEAD Executive Committees were very much in favor of continuing the joint DAP/HEAD joint meeting experiment that was begun in Albuquerque, it has been decided not to force an artificial connection that would be unattractive to both memberships. The Albuquerque meeting was (unfortunately) such a beast, and since we were unable to agree upon the organization for a true joint meeting (or even separate concurrent meetings) it was decided that we should simply plan for independent meetings and hope that at least some of the membership of both organizations (which have substantial overlap) will find both meetings attractive. The HEAD meeting will take place in the Bay Area of California in the autumn of 2006, so that the two meetings will not be in direct temporal competition.

I hope to see you all in Tampa,

Hans A. Bethe Prize

Congratulations to the winner of the 2005 Hans A. Bethe Prize, Stanford Woosley of the University of California at Santa Cruz. He was awarded the prize:

"For his significant and wide ranging contributions in the areas of stellar evolution, element synthesis, the theory of core collapse and type Ia supernovae, and the interpretation of gamma-ray bursts - most notably, the collapsar model of gamma-ray bursts."

We also seek nominations of members to serve on the 2006 and 2007 Prize Committee. Contact Steve Holt ([steve.holt@olin.edu](mailto:steve.holt@olin.edu)) with suggestions. For more information see [www.aps.org/praw/bethe/](http://www.aps.org/praw/bethe/).

### **Nominating Committee for 2005 Election**

Another election approaches. We will choose a Vice-Chair, a Secretary-Treasurer, and two Members-at-large to take office in April 2005, and a Councilor to begin January 2006. If you are interested in this service to the astrophysics community, or know of someone with such inclination, please contact the nominating committee:

Peter Meszaros (chair, [nnp@astro.psu.edu](mailto:nnp@astro.psu.edu))

Elena Aprile

Robert Petre

Rene Ong (APS Appointed)

The current slate of candidates is:

Vice-chair:

Neil Gehrels,

Dan McCammon

Members:

Jim Beatty,

Joan Centrella,

Chung-Pei Ma

Steve Ritz

Secretary:

Tod Strohmayer

Councilor:

Charles Dermer

In addition to nominations from this committee, nominations for any of the positions are accepted from the general membership if submitted in the form of a petition signed by 2% of the DAP membership. (This is would be fulfilled by about 35 signatures.)

### **2005 April Meeting Program**

Most days at the April meeting will feature early plenary sessions, with speakers and subjects of general interest to all APS members. Of special interest to DAP members are these **plenary talks**:

|                  |   |
|------------------|---|
| Hendrik Schatz   | <i>Rare isotopes and thermonuclear explosions: journey through the crust of an accreting neutron star</i> |
| Felix Aharonian  | <i>Probing Supernova Remnants, Black Holes, and Dark Matter with TeV Gamma Rays</i>                       |
| Wendy Freedman   | <i>The Standard Model of Cosmology: Successes and Challenges</i>  |
| Leonard Susskind | <i>The Black Hole Information Paradox</i> (Tentative Title)   |

There are many **invited sessions**, organized by DAP and/or other divisions, of great interest to astrophysicists and students potentially interested in astrophysics:

16 April 2005

**Observational Cosmology**  
**Neutrinos I**  
**Neutrinos II**  
**Space based gravitational wave detection**

17 April 2005

**Baryogenesis and the Dark Matter Problem**  
**Gamma Ray Bursts**  
**Dark Matter**  
**Giant Star Evolution and Nucleosynthesis**  
**Neutron Stars**

18 April 2005

**Active Galactic Nuclei**  
**Dark Energy/Inflation**  
**Space Plasmas**  
**The Link between Neutrinos and the Origin of the Elements**  
**Baryons: birth and death**  
**Earth based gravitational wave detection**

19 April 2005

**The Galactic Center**  
**Extrasolar Planets**

Please check the APS April Meeting website for further details as they develop: <http://www.aps.org/meet/APR05/>

### **DAP Travel Grants for Students attending the APS April Meeting**

We ask you to encourage and support students to attend the upcoming APS April Meeting. There have been modest, but growing, numbers of both graduate and undergraduate students participating in recent meetings. The students uniformly say that they find the meetings rewarding. The large number of 30-minute invited talks provides an excellent introduction to many areas of physics and astrophysics, and they are suited to both experienced researchers and those new to the field. Further, this meeting provides a great opportunity for students to present 10-minute oral presentations.

The Division of Astrophysics decided several years ago to encourage student participation in DAP sessions at the April APS Meeting by awarding approximately ten to fifteen travel grants to student presenters. Any student who is a DAP

member by the time of the meeting, and is first author and presenter of a poster or an oral contribution in a DAP-sponsored session is eligible to be considered for a travel grant award. In recent years some grants have gone unclaimed.

### **Travel Grants Application**

To apply for a travel grant, student members of APS/DAP should send a short letter to the DAP Secretary/Treasurer (lmark@clermson.edu), including a copy of the abstract submitted to the meeting. The letter should contain the following:

a) Name and institution of the applicant,

b) Name and affiliation of the student's thesis supervisor

c) An indication of the applicant's career stage, e.g., second year graduate student, about to submit dissertation, or undergraduate junior.

Up to \$600 is available per grant for out-of-state students. \$250 for Florida students. Travel grants will be awarded on a first-come, first-served basis, for student abstracts judged to be relevant to astrophysics and assigned to a DAP session. The deadline for the travel grant application is February 11, 2005, which is the deadline for early registration for the Tampa meeting, but we encourage applications in early January, prior to the abstract deadline of January 14. (Note that the APS will not process applications for membership in the week preceding the abstract deadline. A non-member student first author submitting an abstract at that time will require an APS member sponsor, and can then join APS and DAP later in January or February.)

### **Fellowship Nominations**

Members of the Division of Astrophysics are invited and encouraged to submit nominations of DAP members for Fellowship in the APS. The number of Fellows elected per year is limited to one-half percent of the current membership, and is apportioned by Division membership. Every year our division has the opportunity to nominate 6 or 7 APS members for Fellowship. On surveying the current list of DAP members, the Executive Committee notes that there is a considerable number of deserving individuals who have not yet been nominated, so please consider who among your colleagues might be in this situation and organize a nomination on their behalf.

If you would like to recommend a member for Fellowship, please do so by filling out the nomination form that can be found, along with related information, at [www.aps.org/fellowship/](http://www.aps.org/fellowship/)

Please submit complete nominations *by May 1* to:

Executive Officer

American Physical Society

One Physics Ellipse

College Park, MD 20740-3844

ATTN: Fellowship Program

Unsuccessful nominations submitted for the first time last year will be reconsidered this year by the Fellowship Committee (additional supporting letters would still be welcome). After one year, nominations must be resubmitted.

### **Join APS Sections and Topical Groups**

We urge all of our division members to consider joining sections, forums and topical groups relevant to you. Membership is free for sections and forums, and very inexpensive (\$7) for topical groups. There are benefits beyond the obvious ones of the meetings, newsletters, and lobbying efforts of the units. Your membership benefits the units and, indirectly, astrophysics.

The geographical sections are funded entirely by APS in proportion to the number of members. It takes seconds to register for *free* online and help your section. The topical groups (e.g., Plasma Astrophysics, and Gravitation) are funded through their dues, but are awarded invited sessions at APS meetings and APS Fellowship Nominations in proportion their membership. More members in groups of interest to you result in more talks and more Fellows in your area. Further, the existence of the topical groups depends on their maintaining a membership threshold. There are several good reasons to join, and no good reasons not to.

## **APS Neutrino Study**

John Beacom

At the end of 2003, the American Physical Society initiated a year-long study on the physics of neutrinos, specifically focused on developing a roadmap to guide the NSF and DOE in funding present and future experiments. Four APS divisions participated: Nuclear Physics, Particles and Fields, Astrophysics, and Beams. The leaders of the Neutrino Study were Stuart Freedman (Berkeley) and Boris Kayser (Fermilab). The web pages of the Neutrino Study are at <http://www.aps.org/neutrino/>.

Seven working groups were defined, with the following leaders:

Solar and atmospheric neutrino experiments

J. Bahcall, J. Klein

Reactor neutrino experiments

G. Barenboim, E. Blucher

Superbeam experiments and development

W. Marciano, D. Michael

Neutrino factory and beta beam experiments and development

S. Geer, M. Zisman

Neutrinoless double b-decay and direct search for neutrino mass

S. Elliott, P. Vogel

Neutrino astrophysics and cosmology

S. Barwick, J. Beacom

Theoretical discussions

R. Mohapatra

Beginning in December 2003, these groups met both in person and virtually, and defined and refined the key scientific questions in their respective areas that required new funding initiatives from the NSF and DOE. The conclusions of the working groups were synthesized in meetings of the whole study in Argonne, Berkeley, and Snowmass (in long sessions in windowless rooms) and in subsequent meetings of the Writing Committee.

Specifically regarding the Neutrino Astrophysics and Cosmology Working Group, our materials, including our final report, are available: <http://home.fnal.gov/~beacom/NuStudy/>.

The report was written by John Beacom, Steve Barwick, Vince Cianciolo, Scott Dodelson, Jonathan L. Feng, George Fuller, Manoj Kaplinghat, Doug McKay, Peter Meszaros, Anthony Mezzacappa, Hitoshi Murayama, Keith Olive, Todor Stanev, and Terry Walker. Steve and I are very grateful to these individuals for sharing their time and expertise, and to the many other Working Group participants for their help.

The main recommendations of our Working Group were:

1. We strongly recommend the development of experimental techniques that focus on the detection of astrophysical neutrinos, especially in the energy range above  $10^{15}$  eV.
2. We recommend support for new precision measurements of neutrino-nucleus cross sections in the energy range of a few tens of MeV.
3. We recommend that adequate resources be provided to allow existing large-volume solar, reactor, proton decay, and high energy neutrino telescopes to observe neutrinos from the next supernova explosion and participate in a worldwide monitoring system.

Furthermore, future large-volume detectors should consider the detection of supernova neutrinos an important science goal and plan accordingly. These all appeared in some form in the recommendations of the Neutrino Study. Additionally, our Working Group made specific endorsements regarding neutrinos in cosmology, theoretical and computational research involving neutrinos, maintaining the presently planned program, and low-energy solar neutrino detection.

The main recommendations of the Neutrino Study were:

1. We recommend, as a high priority, a phased program of sensitive searches for neutrinoless nuclear double beta decay.
2. We recommend, as a high priority, a comprehensive U.S. program to complete our understanding of neutrino mixing, to determine the character of the neutrino mass spectrum and to search for CP violation among neutrinos.
3. We recommend development of an experiment to make precise measurements of the low-energy neutrinos from the sun.

These were the large new initiatives. The Neutrino Study takes great care to place these in the context of the present program and assumptions about its future, and to separately develop recommendations for medium and small-scale experiments. The prospects for experiments on and with neutrinos are excellent, and their impact on physics, astrophysics, and cosmology has only barely been glimpsed.

### **Future Newsletters**

If you have items of general interest to DAP members, consider submitting them to the Secretary-Treasurer for upcoming newsletters (February and November 2005.) We will be happy to publish meeting announcements or letters.

### **APS/DAP on the WWW**

<http://photon.phys.clemson.edu/dap/>