

# DPF Newsletter - December 2003

The DPF newsletter is published roughly twice a year. Contributions are always welcome. Please send them to the Editor.

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## DPF and APS Election News

Joe Lykken was elected Vice-Chair of the DPF in this year's election. Mike Tuts was elected Secretary-Treasurer, and John Jaros, Divisional Councilor. The new Executive Committee members are Daniela Bortoletto and Hitoshi Murayama.

The members of the 2004 DPF Executive Committee and the final years of their terms are

Chair: Sally Dawson (2004).  
Chair-Elect: Bill Carithers (2004).  
Vice-Chair: Joe Lykken (2004).  
Past Chair: Jon Bagger (2004).  
Secretary-Treasurer: Mike Tuts (2006).  
Division Councilor: John Jaros (2007).

**Executive Committee Members:** Howard Haber (2004), Elizabeth Simmons (2004), Marcela Carena (2005) and John Womersley (2005), Daniela Bortoletto (2006) and Hitoshi Murayama (2006).

We would like to take this opportunity to thank the DPF Executive Committee members whose terms expired in 2003: Stan Wojcicki (Past Chair), Nick Hadley (Secretary-Treasurer), Peter Meyers (Division Councilor) and Marty Breidenbach and Young-Kee Kim (Executive Committee members). The DPF is fortunate to have such dedicated people who give so freely of their time. We would also like to express our appreciation to all who agreed to run for DPF office this year. We were privileged once again to have an excellent slate of candidates.

### **Message from the Chair**

As my year as Chair of DPF winds down, I would like to encourage DPF members to make a New Year's resolution to redouble their efforts on education and outreach.

I believe that we are at an important juncture in the history of our field. We are now at the point where we can assert with confidence that the broad sweep of the Standard Model has been impressively confirmed by experiment, and that new discoveries – neutrino mass, dark matter, dark energy – point to new physics that will extend the scope of our field. Public interest in particle physics is as high as ever – 35,000 copies of Quarks Unbound, the DPF outreach booklet, have flown out the door. Particle physics projects were featured prominently in the recent DOE report, Facilities for the Future of Science, released in Washington by the Secretary of Energy.

As we speak, several committees are at work making the case for our field. A HEPAP subcommittee chaired by Persis Drell is writing a report connecting particle physics to cosmology, expanding on this new vision for particle physics. The APS Divisions of Particles and Fields, Nuclear Physics, Astrophysics, and Physics of Beams are co-sponsoring a year-long workshop, under the leadership of Stuart Freedman and Boris Kayser, to study neutrino physics in all its richness and diversity. And finally, ICFA has charged an international committee, chaired by Barry Barish, to select the technology for the linear collider before the end of 2004.

The success of the Standard Model has transformed our field and has opened new

opportunities for future discovery. The degree to which we can realize this future depends upon our ability to carry the public along in the adventure. I would like to encourage each and every one of you to reach out to other communities – local schools, other departments, even other physicists in your own department – to show them the exciting things that are going on in modern particle physics. Resources to help are available at [www.interactions.org](http://www.interactions.org). Or talk to a member of the DPF Education and Outreach Committee, listed on the DPF web site.

We have a terrific story to tell. Let's get the message out!

## **APS Meeting**

The April Meeting of the APS will be held in Denver, May 1-4, 2004. The meeting will have sessions organized by the Divisions of Astrophysics, Nuclear Physics, Particles and Fields, Physics of Beams, Plasma Physics and Computational Physics, as well as various Forums and Topical Groups. The deadline for submitting abstracts is January 9, at [www.aps.org/meet/APR04/](http://www.aps.org/meet/APR04/).

Plenary talks include Adelberger, Tests of Newton's inverse-square law: probing the true geometry of the Universe; Bennett, The undiscovered world: cosmology from WMAP; Bustamante, Studies of DNA packaging using optical tweezers; Feng: Physics in the dark ages: puzzles, progress and prospects; Jacek, A new kind of matter at the Relativistic Heavy Ion Collider?; Kayser, The neutrino world: present and Future; Lamb, Shooting down what's going up: could boost phase defenses against ICBMs work?; Parker, The microworld of solar corona; Swinney: Spontaneous emergence of order in vibrated sand.

There will also be DPF invited sessions, DPF contributed sessions, and a special session devoted to the Neutrino Study discussed below.

## **DPF Meeting**

The 2004 DPF Divisional Meeting will be held at the University of California at Riverside, August 27-31, 2004, with a welcome reception on the evening of August 26 at the Mission Inn, a National Historic Landmark Hotel in downtown Riverside. The parallel and plenary sessions will be held on the U.C. Riverside campus. There will also be a Town Meeting, a public lecture, an evening music performance, and a conference banquet at the Riverside Municipal Auditorium. The scientific program is being organized by physicists at U.C. Riverside and other southern California universities. Sunday August 29 will be a free day; participants will be free to enjoy some of the many attractions in southern California.

Riverside can be easily reached from the Ontario International Airport, which is about 25 miles away (no need to fly to LAX!). Registration and conference information will be available on the conference web site, <http://www.dpf2004.org>, which is linked to the DPF home page.

## **Joint DPF, DPB, DNP, DAP Study of Physics of Neutrinos**

The APS Divisions of Particles and Fields and of Nuclear Physics, together with the APS Divisions of Astrophysics and the Physics of Beams, are sponsoring a year-long Study on the Physics of Neutrinos. The Study will provide a framework for a diverse community of scientists to examine the broad sweep of neutrino physics, and if possible, to move towards agreement on the next steps towards answering the questions that drive the field. The Study will lay scientific groundwork for the choices that must be made during the next few years.

The Study leaders are Stuart Freedman from U.C. Berkeley and Boris Kayser from Fermilab. The organizing committee includes Janet Conrad, Guido Drexlin, Belen Gavela, Takaaki Kajita, Paul Langacker, Keith Olive, Bob Palmer, Georg Raffelt, Hamish Robertson, Stan Wojcicki, and Lincoln Wolfenstein. There will be six Working Groups, whose topics and leaders are --

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, W. Zisman)

Neutrinoless double beta decay and direct searches for neutrino mass

(S. Elliott, P. Vogel)

What cosmology/astrophysics and neutrino physics can teach each other

(S. Barwick, J. Beacom)

Theory coordinator

(R. Mohapatra)

Each Working Group will include experimentalists and theorists. In light of the many relations between the topics of the Study, there will be considerable crosstalk between the different Working Groups. The theorists will be asked to consider how the neutrino properties to be measured can teach us about the physics underlying neutrino mass and discriminate between models, and to consider the relation between neutrino behavior that can be observed today and leptogenesis - baryogenesis in the early universe.

The inaugural meeting of the Study was held at Argonne on December 13-14. The meeting started Saturday morning with a meeting of the organizers. On Saturday afternoon there was a plenary session, including a statement of the purpose and method of the Study, remarks by APS Divisional and funding agency representatives, talks on the current status and future goals of neutrino physics, and statements by Working Group leaders of what their Groups hope to accomplish. Most of Sunday, the Working Groups met separately to organize themselves and begin their work. The meeting concluded with

a brief plenary session in which all the Working Groups reported on their plans.

The Working Groups will meet as necessary during the year, with the goal of completing their work in time for a final general meeting of the Study in late May or early June. A document conveying the results of the Study will be prepared by the end of August.

Participation by all interested people is warmly encouraged. Anyone who was not able to attend the Dec 13-14 meeting but would like to join one or more Working Groups should contact the appropriate Working Group leaders.

### **Visa and National Laboratory Access Problems**

The APS and the DPF are continuing their efforts to improve the situation relating to visas and laboratory access. If you have problems, please contact Irving Lerch or Michele Irwin of the APS International Affairs Office. Please notify the DPF chair as well. This helps us document the difficulties that people are experiencing. Our complaints have been heard by the U.S. Department of State and others, but the situation has not improved much. See [http://www.fnal.gov/orgs/fermilab\\_users\\_org/BNL\\_meet\\_summary.txt](http://www.fnal.gov/orgs/fermilab_users_org/BNL_meet_summary.txt) for a summary of a recent meeting at Brookhaven, which had in attendance officials from U.S. State Department, DOE, and the Department of Homeland Security.

### **Conference Announcements**

If you are a European member of the DPF and would like to continue to receive email announcements of non-APS conferences by email, you must “opt-in” to get them. New EU anti-spam regulations forbid the sending of such messages by the APS. You may “opt-in” via a link from the DPF home page.

### **Education and Outreach Subcommittee (EOS)**

Please visit the education and outreach pages of the particle physics news and resources website, <http://www.interactions.org>, launched in summer 2003. The EOS collaborated in the creation of this part of the site. Similar information will be coming soon to the DPF's own web site.

The list of sample talks is still shorter than we'd like, so please contribute a URL! We want links to good presentation about high-energy physics for the general public, non-high-energy physicists, other scientists, and students or teachers. Please send your links the chair of the EOS, Liz Simmons, [esimmons@msu.edu](mailto:esimmons@msu.edu).

Members of the EOS are collaborating with astrophysicists and condensed matter physicists to organize a summer 2004 workshop on physics education & public outreach at the Aspen Center for Physics. Details will be coming soon to the ACP website.

### **Report from the US Linear Collider Steering Group (USLCSG)**

Contributed by Harvey Lynch (Executive Secretary of the USLCSG)

The USLCSG web site is <http://www.slac.stanford.edu/hll/USLCSG/>. More information can be obtained by drilling down in the appropriate categories.

Since its formation in May 2002, the USLCSG has held 13 meetings, either face to face or via teleconference. This year there have been eight meetings.

The Linear Collider is moving forward on many levels. First and foremost, the Spencer Abraham, the Secretary of Energy, identified the Linear Collider as the highest priority mid-term facility in the Office of Science's facilities plan, [http://www.sc.doe.gov/Sub/Facilities\\_for\\_future/20-Year-Outlook-screen.pdf](http://www.sc.doe.gov/Sub/Facilities_for_future/20-Year-Outlook-screen.pdf). This is great news because it is the first official endorsement of the Linear Collider by the DOE. See the Washington area of <http://www.slac.stanford.edu/hll/USLCSG/> for related information.

Linear Collider R&D is continuing to progress. Last year there was very good response to the call for R&D proposals. A large number of high quality proposals was received, evaluated, and submitted to DOE and NSF. The arrival of funds was somewhat slower than had been expected, but we hope this year will be better. The process has been fine-tuned and a new cycle is under way. The review of the proposals was done at a meeting at FNAL on 11-12 December.

The World Wide Study Group for the Physics and Detectors for the Linear Collider has crafted a consensus document outlining the physics case for the Linear Collider. It is available at [http://sbhep1.physics.sunysb.edu/grannis/lc\\_consensus.html](http://sbhep1.physics.sunysb.edu/grannis/lc_consensus.html). To date, it has been signed by 2000 particle physicists worldwide. To add your name, visit the above web site.

The American Linear Collider Physics Group has prepared a scope document defining the physics needs and necessary machine performance of the Linear Collider. The document is available at <http://www.slac.stanford.edu/hll/USLCSG/BidToHost/MachineScopeA30323.pdf>. A related document, "Parameters for the Linear Collider," was crafted by a subcommittee of the International Linear Collider Steering Committee. This document is available under ILCSC at <http://www.slac.stanford.edu/hll/USLCSG/General/index.html>.

In order to move towards a bid to host of a Linear Collider in the U.S., the USLCSG felt that it is important to examine the relative costs and performance of the warm and cold accelerator technologies. A subcommittee on accelerator options was commissioned in January 2003 to make a comparative analysis. Their report (about 400 pages) is nearing completion. It will be submitted to the Steering Group and released to the community in January.

ICFA will make the final decision on the machine technology. To that end, ICFA has set up an International Technology Recommendation Panel (ITRP). The panel will report by

the fall of 2004. The report of the accelerator options subcommittee will be submitted to the ITRP. The Committee's membership and charge are posted at <http://www.fnal.gov/directorate/icfa/ITRCAnnounce.pdf>.

The ITRP consists of four members from each of three regions: the Americas, Asia, and Europe.

CFA asked the USLCSG to nominate the members from the Americas. After extensive consultations with the accelerator and particle physics communities, the USLCSG submitted its recommendation: Jonathan Bagger, Barry Barish, Paul Grannis and Norbert Holtcamp. For the Chair, ICFA then asked each region to submit two names, at least one of which was from outside the region making the recommendation. From the set of 12, Barry Barish was selected as Chair. The Committee's first meeting will be in January, 2004.

## **Report from P5**

Contributed by Abe Seiden (P5 chair)

The Particle Physics Project Prioritization Panel (P5) presented its first report to HEPAP at the end of September. This report was endorsed by HEPAP and forwarded to the DOE and NSF. The work of P5 included an update to the 20-year roadmap for the field. The roadmap, as well as the first P5 report, can be found at: [http://www.science.doe.gov/hep/hepap\\_reports.shtm](http://www.science.doe.gov/hep/hepap_reports.shtm).

Projects on the roadmap were chosen to provide potential world-class science projects that will position the field to best explore the frontiers of matter, energy, space and time. Several of the important projects appear on the recent plan for "Facilities for the Future of Science" presented by the Secretary of Energy, which provides a 20-year plan of major facilities for the entire office of science; several figure prominently in the list of approved projects of the NSF.

The prime focus of P5 is to serve as guardian of the roadmap. This includes prioritization of large projects that are ready for a construction start. The P5 report presents the first such evaluation, based on a request to review three projects ready for construction:

1. the CDF and DØ upgrades for Run IIB of the Tevatron Collider;
2. the BTeV experiment that would carry out very high sensitivity studies of the decays of B hadrons;
3. the CKM experiment, which has as its primary goal the study of a very rare charged kaon decay whose decay rate provides an excellent Standard Model test.

The P5 report notes that the Tevatron is the forefront facility in high-energy physics and should continue in this role for the next five years. The report therefore strongly endorses the upgrades of the trigger, data acquisition systems, and offline systems required to take data at the higher luminosities expected over the next few years. The panel concluded that the overriding priority of the Tevatron physics program should be to maximize the

physics-quality data recorded by the end of 2008. It strongly supported the Fermilab management's decision that the silicon detector upgrades not be constructed given the priority for running and collecting data with a well understood detector.

The P5 panel also concluded that quark flavor physics should remain an important part of the U.S. program into the next decade. It will contribute to characterizing and understanding the physics at the TeV mass scale, to be explored by the LHC, by measuring its footprint on the quark sector. The panel concluded that BTeV represents a breakthrough in the design of a flavor physics experiment at a collider, given its powerful trigger system and comparable resolution for charged and neutral particles. Subject to constraints within the HEP budget, a rapid start for BTeV construction and enhanced optics at the interaction region to maximize luminosity were recommended.

The final project considered was CKM. While given lower priority than BTeV, which has a broader physics program, CKM was found to be an elegant world-class quark flavor physics experiment. It could not, however, be recommended for construction given presently foreseen funding constraints.

The High Energy Physics laboratories and the agencies are presently looking at plans for the midterm and long term future. We anticipate that P5 will participate in this planning process once it is further along.

## **DPF Statements of Appreciation**

In recent statements, the Executive Committee of the Division of Particles and Fields expressed its deep appreciation to Peter Rosen and John O'Fallon for their many years of service in the Division of High Energy and Nuclear Physics in the DOE Office of Science. They led the Division through difficult times and into an era of remarkable discoveries and achievements.

Recent years have witnessed the discovery of the top quark, the observation of dark energy, the detection of neutrino masses and mixings, the study of CP violation in B quark systems, the amazingly precise measurement of  $g-2$  of the muon, as well as the beginning of new experimental programs at the Relativistic Heavy Ion Collider. Through their work at DOE, Peter and John deserve substantial credit for these and other successes.

Peter and John also led the field into an era of increasing international cooperation, with scientists from around the world participating in experiments in the US, and US scientists participating in experiments in Europe and Asia. John also played a key role in our successful negotiations with CERN to allow US participation not only in the LHC experiments, but also in the construction of the accelerator itself.

The Division of Particles and Fields looks forward to working with them in their new positions at DOE. As particle physics becomes increasingly international, with new major initiatives such as the linear collider, their leadership will be as important as ever before.

## **Quarks Unbound**

The DPF education and outreach booklet, Quarks Unbound, received a “Golden Trumpet” award from the Publicity Club of Chicago. Congratulations to Sharon Butler, the booklet’s author, and to Chris Quigg, who conceived the idea of writing it. The DPF would like to thank an anonymous donor for funding a second printing, and the Fermilab Friends for Science Education for handling the mechanics of distribution. Copies can be ordered at [www.aps.org/units/dpf/quarks\\_unbound/](http://www.aps.org/units/dpf/quarks_unbound/).

## **New Internationally Recommended Values of Fundamental Constants**

The new self-consistent set of values of over 300 basic constants and conversion factors of physics and chemistry recommended by the Committee on Data for Science and Technology (CODATA) for international use is now available on the NIST Physics Laboratory Web site at <http://physics.nist.gov/constants>. The new values, named the 2002 set, is the result of the 2002 least-squares adjustment of the values of the constants carried out by Peter Mohr and Barry Taylor of the Physics Laboratory’s Atomic Physics Division under the auspices of the CODATA Task Group on Fundamental Constants. The new 2002 set of values, based on all the data available through 31 December 2002, replaces its immediate predecessor recommended four years earlier by CODATA, which resulted from the 1998 least-squares adjustment also carried out by Mohr and Taylor under Task Group auspices. It is expected that a lengthy paper that describes in detail the 2002 data and their analysis will be published in an archival journal in 2004. For further information, contact Peter Mohr, [mohr@nist.gov](mailto:mohr@nist.gov), or Barry Taylor, [barry.taylor@nist.gov](mailto:barry.taylor@nist.gov).

## **DPF Committees**

We thank the following members of our community who generously gave their time to serve on DPF committees this year:

### **Nominating Committee**

H. Weerts (chair), D.B. Kaplan (vice-chair), M. Cvetcic, A. Falk, V. Luth, D. Naples

### **W.K.H. Panofsky Prize Committee**

W. Molzon (chair), H. Gordon (vice-chair), T. Kajita, H. Prosper, N. Roe

### **J.J. Sakurai Prize Committee**

B. Kayser (chair), P. Langacker (vice-chair), L. Dixon, L. Orr, A. Sirlin

### **Robert R. Wilson Prize Committee**

S. Ozaki (chair), P. Limon (vice-chair), S. Y. Lee, T. Raubenheimer, A.N. Skrinsky

### **Tanaka Dissertation Award Committee**

P. Rankin (chair), R. Partridge (vice-chair), A. Bodek, K. Heller, H. Schellman