

# DPF NEWSLETTER - December 31, 1997

To: Members of the Division of Particles and Fields

From: Jonathan Bagger, Secretary-Treasurer, [bagger@jhu.edu](mailto:bagger@jhu.edu)

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## Joint Meeting of the APS/AAPT

The 1998 Joint Meeting of the APS/AAPT will be held April 18-21, 1998 in Columbus, Ohio. The deadline for submission of abstracts for contributed papers is January 16, 1998 at APS headquarters. Electronic submission of abstracts is strongly encouraged to facilitate organizing the parallel sessions (see <http://www.aps.org/meet/APR98/>).

This year the DPF has led an effort to change the format of the meeting. Each morning will feature one special plenary session featuring three talks of broad interest to physicists in all fields. The hope is that these sessions will be of broad interest to members of DPF and other Divisions. The plenary speakers and the titles of their talks are listed at <http://www.aps.org/meet/APR98/bios.html>.

The conference will also have topical sessions with a full range of invited talks. The DPF will sponsor two sessions, and co-sponsor joint sessions with the Divisions of Astrophysics, Nuclear Physics, Beams, as well as the Topical Group on Precision Measurements and Fundamental Constants. The titles of the sessions are listed below. (For more information, see <http://www.aps.org/units/dpf/conferences/april98.html>.)

GFC/DPF/DNP: Flavor and CP Signals of Supersymmetry; April 18, 1998, 11:00 AM.

DAP/DPF: High Energy Gamma-Ray Probes of Cosmic Particles and Fields; April 18, 1998, 2:00 PM.

DPF/DPB: Future HEP Facilities; April 19, 1998, 11:00 AM.

DPF/DPB: Prize Session and DPF Business Meeting; April 19, 1998, 2:00 PM.

DPF: Searches Beyond the Standard Model; April 20, 1998, 11:00 AM.

DPF/DPB: Neutrino Oscillation Experiments; April 20, 1998, 2:00 PM.

DPF: Rare K and B Decays; April 21, 1998, 8:00 AM.

## DPF 99

DPF 99 will be held January 6-9, 1999, at the University of California, Los Angeles. Registration will be the day before. The Local Organizing Committee is chaired by Roberto Peccei and David Cline of UCLA; it involves representatives from UCLA, UCI, Caltech, USC, UCSD, UCR, UCSB. More information will soon appear on the conference web site, <http://www.physics.ucla.edu/dpf99/>.

## **Public Information Coordinator**

On December 31, Michael Barnett will end a three-year term as DPF Public Information Coordinator. Paul Grannis wrote him the following letter of appreciation.

On behalf of the DPF Executive Committee, and for all of the Division, I write in great appreciation for the job you have done over the past three years as Public Information Coordinator. Though originally conceived as a way for particle physics to make useful connections to the public through the news media, this job has expanded far beyond the original conception with your leadership.

The now annual receptions for members of Congress and their staffs have become a valuable way for the community to inform and educate Congress on the importance of basic research in general, and particle physics specifically. Your initiative in organizing these receptions has helped to make the case that basic research is a superb investment for the country to make, and has served as a focus for individual physicists to make personal contacts with members of the Congress.

A more general manifestation of the original charge for the PIC is the need for research scientists to make their work generally accessible and understandable to the schools and to the public. Your efforts to create new materials for this outreach have been notable, and the recent documentation of these and similar efforts as a tool for teachers and interested members of the public on the DPF web page are commendable.

We are appreciative of the effort and creativity that you brought to the PIC position for the last several years, and are grateful for the guidance you gave in improving these vital activities by the Division. We look forward to your insights and energies in continuing to help the DPF carry its message to the broadest possible audience.

Michael Barnett will be replaced as PIC by Bob Cahn of LBNL. The Congressional Reception will be run by Bruce Barnett of Johns Hopkins.

## **Education and Outreach**

During recent years, the HEP community has become increasingly aware of the need to improve its efforts in education and outreach. Indeed, in his December review of Mathematical and Physical Sciences, NSF Director Neal Lane emphasized once again the need for an enhanced role in education, outreach and diversity.

In response to this call, the DPF has posted a web page, prepared by Michael Barnett, on education and outreach. This site, <http://www.aps.org/units/dpf/education.html>, contains links to many other educational pages. If you know of an interesting site that is not listed, please contact Cathy Newman-Holmes, the incoming Secretary-Treasurer of the DPF, at [cath@fnal.gov](mailto:cath@fnal.gov).

## **Education and Committee on Gravitational Physics**

Once a decade, the National Research Council's Board on Physics and Astronomy (BPA) prepares a survey of the fields of physics. These surveys play an important role in conveying the consensus of the scientific community on past achievements and future priorities. For the first time, the new survey will contain a volume on Gravitational Physics prepared by a Committee on Gravitational Physics.

The Committee will be chaired by James Hartle of the University of California, Santa Barbara. The report will make recommendations on both experimental and theoretical gravitational physics. Further details, and a list of the Committee membership, may be found at <http://www.nas.edu/bpa/projects/cgp/>.

The committee invites written comments, which should reach the committee by the end of January, 1998. It may be sent by e-mail to [bpa@nas.edu](mailto:bpa@nas.edu) identifying "Gravitation" on the subject line, by fax to the BPA at 202-334-3575, or by mail to Board on Physics and Astronomy, Committee on Gravitational Physics, HA-562, National Research Council, 2101 Constitution Ave, NW, Washington, DC 20418.

## **NSF Special Emphasis Panel**

The National Science Foundation has established a new "Special Emphasis Panel in Elementary Particle Physics," the third in the series of such panels. The Panel will be chaired by Bob Cahn of LBNL. It will meet January 15 and 16, 1998, at NSF headquarters in Arlington, Virginia. The charge to the Panel is:

The study of B particles is an increasingly important component of the national and international high-energy physics program. Within the next two or three years, current experiments will be joined by new major efforts designed to study the properties of B decays, and especially CP violation. Requests to participate in these programs may well exceed the capability of the Elementary Particle Physics program at NSF to fund them. The program asks the Special Emphasis Panel to assess the opportunities for fundamental discoveries in B physics and to identify the approaches that are the most suitable for support by EPP over the next five years.

Presentations will be made by representatives of BABAR, B-TeV, CDF, CLEO, DO, HERA-B, and LHC-B. Information on the Panel may be found at <http://www-physics.lbl.gov/~rncahn/cahn.cfm>.

## **HEPAP News**

HEPAP met at Cornell University on October 14 and 15. John O'Fallon discussed the FY98 budget for DOE High Energy Physics. The total of \$677.9M is a little over 1% above that for FY97 (\$670.1M), but \$4.9M of this increase does not go to HEP activities. U.S. participation in the LHC will be funded at the level of \$35M in FY98.

CESR/CLEO presented a summary of their recent results and future plans. The present peak luminosity is about  $4 \times 10^{32}$  (in  $\text{cm}^{-2} \text{s}^{-1}$ ) and the next upgrade is designed to increase this to  $1.7 \times 10^{33}$ . The associated detector upgrade, CLEO-III, includes a new drift chamber, a new silicon vertex detector, and hadron identification using a RICH counter; it is scheduled to start data taking in early 1999. Preliminary plans are being considered for a further upgrade to  $3 \times 10^{34}$ , using a new two-ring machine running at equal energies.

There was a special session on U.S. involvement in experiments at accelerators outside the country. HEPAP members stressed the importance of U.S. participation in such experiments since these accelerators often provide the only opportunity to study certain physics problems. All of the presentations on experiments overseas stressed the importance of reliable, high-bandwidth network connections. A special session on networks and their use for high energy physics is planned for the spring HEPAP meeting, expected to be held May 14-15, 1998, at LBNL.

The next meeting of HEPAP will be held February 18-19, 1998, at the DoubleTree Hotel in Rockville, MD. It will be a particularly full meeting, with extensive discussions on both the report of the Subpanel on Planning for the Future of U.S. High Energy Physics, chaired by Fred Gilman, and the FY99 budget request for High Energy Physics. The preliminary agenda and other HEPAP information can be viewed via the DOE-HEP home page, <http://www.hep.net/doe-hep/home.html>.

## **Subpanel News**

The Subpanel on Planning for the Future of U.S. High Energy Physics is well along in its work. Its draft report will be presented to HEPAP for its consideration at a meeting in Rockville, MD, on February 18-19.

The Subpanel has received information through a variety of channels, including 150 presentations made at a series of three open meetings, held in the San Francisco, Chicago, and New York regions. The Subpanel also received approximately 120 direct submissions from individuals and groups.

## **Task Force on Physics Today**

The APS has appointed a Task Force on Physics Today which will evaluate the content and style of Physics Today. The goal of the study is to suggest ways in which the magazine could better serve the diverse interests of the APS membership.

It is expected that the task force will complete much of its work by the April 17, 1998 meeting of the APS Council. The Chair of the task force is Burton Richter of SLAC. He invites comments and suggestions at [brichter@slac.stanford.edu](mailto:brichter@slac.stanford.edu).

## **1998 APS Prizes**

The 1998 Prizes have been announced by the APS. The following awards are relevant to members of the DPF.

The *1998 Hans A. Bethe Prize*, to John Bahcall of the Institute for Advanced Study,

For his fundamental work on all theoretical aspects of the solar neutrino problem and his important contributions to other areas of nuclear astrophysics.

The *1998 Tom W. Bonner Prize in Nuclear Physics*, to Joel M. Moss of Los Alamos National Laboratory,

For his pioneering experiments using dimuon production in proton-nucleus interactions which demonstrate that there is no antiquark enhancement in nuclei, and which delineate the unusual features of charmonium and open charm production in nuclear systems.

The *1998 Dannie Heineman Prize for Mathematical Physics*, to Nathan Seiberg and Edward Witten for the Institute for Advanced Study,

For their decisive advances in elucidating the dynamics of strongly coupled supersymmetric field and string theories. The deep physical and mathematical consequences of the electric-magnetic duality they exploited have broadened the scope of Mathematical Physics.

The *1998 Maria Goeppert-Mayer Award*, to Elizabeth J. Beise of the University of Maryland,

For important and challenging electron scattering studies of the structure of the nucleon and few-nucleon systems, and her outstanding experimental skills and leadership ability in all phases of these studies.

The *1997 Nicholson Medal for Humanitarian Service*, to Henry Kendall of M.I.T.,

For his important role in creating and leading the Union of Concerned Scientists, which has had a lasting impact on many scientific issues of concern to society, and for his outstanding personal contributions to these areas and education at all levels.

The *1998 J.J. Sakurai Prize for Theoretical Particle Physics*, to Leonard Susskind of Stanford University,

For his pioneering contributions to hadronic string models, lattice gauge theories, quantum chromodynamics, and dynamical symmetry breaking.

The *1998 W.K.H. Panofsky Prize in Experimental Particle Physics*, to David Nygren of Lawrence Berkeley National Laboratory,

For the concept, development, and application of the time projection chamber (TPC),

enabling unprecedented studies of complex topologies of charged particles produced in high energy collisions of interest to both high energy and nuclear physics.

The *1998 Robert R. Wilson Prize for Achievement in the Physics of Particle Accelerators*, to Matthew Sands of the University of California, Santa Cruz,

For his many contributions to accelerator physics and the development of electron-positron and proton colliders and for his importance as teacher and role model for many generations of scientists.

The *1998 Dissertation Award in Nuclear Physics*, to Yury G. Kolomensky (Advisor: Gerald Peterson) of the University of Massachusetts,

For experimental work employing spin-dependent deep inelastic scattering which resulted in the most precise determination of spin-dependent structure functions of the neutron and led to a better understanding of the dynamics of quarks and gluons.

Information on nominations for 1999 prizes may be found at <http://www.aps.org/praw/nomguide.html>.

## **New APS Fellows**

The 1997 APS Fellows in the Division of Particles and Fields have been announced. The new Fellows are

Jonathan A. Bagger  
Persis S. Drell  
Kam-Biu Luk  
Ronald J. Madaras  
Robert L. McCarthy  
Frank S. Merritt  
John R. O'Fallon  
Joseph G. Polchinski  
Charles Y. Prescott  
Veljko Radeka  
Mikhail A. Shifman  
Andris Skuja  
Arkady Vainshtein  
Mikhael B. Voloshin  
Hendrick J. Weerts  
Geoffrey B. West  
Hugh H. Williams

Nominations for APS/DPF fellowships for 1998 are due by April 1, 1998; information is available at <http://www.aps.org/fellowship/>.

## **DPF Standing Committees**

During the course of the year, the DPF Executive Committee relies on four standing committees to carry out various important and time-consuming tasks on behalf of the DPF. They are the Nominating, Panofsky Prize, Sakurai Prize, and Wilson Prize Committees.

The members of these committees for the past year are listed below. The DPF Executive Committee would like to express its thanks to them for their special contributions on behalf of our community.

### **Nominating Committee**

Bill Reay (Chair)  
JoAnne Hewett  
Robert Jaffe  
Michael Murtagh  
Jeffrey Richman  
Paul Slattery

### **Panofsky Prize Committee**

James Pilcher (Chair)  
Raymond Brock  
Gail Hanson  
Jonathan Rosner  
Michael Zeller

### **Sakurai Prize Committee**

William Marciano (Chair)  
William Bardeen  
Robert Cahn  
Glennys Farrar  
Jeffrey Harvey

### **Wilson Prize Committee**

Claudio Pellegrini (Chair)  
Ilan Ben-Zvi  
Helen Edwards  
Hermann Grunder  
Albert Hofmann

## **Vacancies at DOE and NSF**

The Department of Energy's Division of High Energy Physics is looking for an experienced physicist to lead its Facilities Operations Team. The individual being sought will supervise, organize and coordinate activities of the Division concerned with the operation of accelerator, colliding beam and experimental research facilities at each of the accelerator centers. Further details about the job can be found in the Vacancy Announcement posted on the DOE-HEP web page (<http://www.hep.net/doe-hep/job.html>). Or, call John O'Fallon, Director of the Division, at (301) 903-3624.

The National Science Foundation searching for a new Director of its Physics Division. The official announcement can be reached from <http://www.nsf.gov/home/chart/work.html>. For FY99, the NSF Division of Physics expects to hire an additional Program Officer in Elementary Particle Physics to three. One of the Program Officers will be designated as permanent. A search will soon be announced on the NSF web site.

These are excellent opportunities for people who want to make a difference. To quote John O'Fallon in *Fermi News*, "There is no better view of the world of physics than the view from here."

### **Agreement on the Large Hadron Collider**

On December 8, 1997, representatives of the United States and CERN signed an International Cooperation Agreement Concerning Scientific and Technical Cooperation on Large Hadron Collider Activities. DOE Secretary Federico Peña and NSF Director Neal Lane signed the Agreement on behalf of the United States, and Director General Christopher Llewellyn-Smith and Council President Luciano Maiani signed on behalf of CERN. OSTP Director Jack Gibbons presided over the ceremony.

The remarks of Secretary Peña and Director Lane are excerpted below. (The full text of all the speeches is given on the DPF web site, <http://www.aps.org/units/dpf/LHC.html>).

#### **Secretary Peña:**

Today, we are embarking on an extraordinary scientific journey that will take us to new heights of knowledge about the fundamental nature of the universe.

I have no doubt that when the history of the next 50 years is written, the Large Hadron Collider and all of the science, new ideas and technologies it spawns will be a major chapter.

The agreement we are signing builds on the long tradition of successful international cooperation that the Department of Energy's national laboratories and the nation's universities have created with their counterparts around the world.

Let me take a moment to thank and congratulate all of the people who have made today's



historic agreement possible. They include:

Professor Sidney Drell, the distinguished Deputy Director of the Stanford Linear Accelerator Center, who led the Department of Energy's High Energy Physics Advisory Panel that recommended that the Department of Energy and National Science Foundation participate in the Large Hadron Collider initiative. Dr. Drell, would you please stand and be recognized?

And members of Congress who have been strong supporters of the LHC, including the Honorable James Sensenbrenner, Chairman of the House Science Committee, and Representatives George Brown and Sherry Boehlert. I understand we have some staff members from those Congressional here with us today. Would you stand and be recognized?

And the principal negotiators of this agreement: Dr. Martha Krebs, Dr. Robert Eisenstein (Director of Mathematical and Physical Sciences at NSF), and Professor Christopher Llewellyn Smith (Director General of CERN). This is a landmark agreement and it makes sense for America, Europe and the world. You are to be commended for your vision and hard work.

Let's give all of these individuals a well-deserved round of applause. What I would like to discuss today is:

- How this pathbreaking agreement will work.
- Why the fundamental science that will emerge from the Collider will prove so important to our future.
- And why international scientific cooperation like this plays a helping to develop common solutions to our greatest challenges.

### *Pathbreaking Agreement*

When we sign this agreement in a few moments, it will mark the first time the U.S. government has agreed to contribute significantly to the construction, through domestically-produced hardware and technical resources, of an accelerator outside of our borders.

And this is the first agreement between the European Laboratory for Particle Physics, known as CERN, and U.S. government science agencies -- which is a teaming of some of the world's greatest scientific talent.

And we aren't alone in our enthusiasm for the Large Hadron Collider. Other nations that are not members of CERN -- Japan, Canada, Russia, India and Israel -- have agreed to join this international scientific effort.

The Department of Energy will invest \$450 million in services and goods for the Collider, while the National Science Foundation will contribute \$81 million in services

and goods. This is about 10% of the total cost of the Collider and detectors.

Our investment will enable about 25 percent of the U.S. experimental high energy physics community to take advantage of the unique research capabilities of the Collider when it becomes operational in 2005. And what will the Collider do? It will accelerate protons up to speeds just a fraction under the speed of light and smash them together at higher energies than any machine has ever before achieved.

The results of the collisions will allow physicists to study in unprecedented detail and precision the structure of matter, and to shed new light on some of the mysteries of the universe.

### *Science and Technology Results*

It's sometimes difficult for a non-scientist to fully appreciate why the work at the Large Hadron Collider will be so important to our future.

I believe the answer lies with the one quality of human kind that helped our most distant ancestors begin the long climb to civilization: curiosity. As Ralph Waldo Emerson said, "Men love to wonder, and this is the seed of our science."

Human kind has never ceased wondering about the universe we inhabit. This eternal quest for knowledge is what has led to discoveries like the top quark at Fermilab.

I am told that this quark is 300,000 times heavier than an electron or about as heavy as an atom of gold. The long standing issue of how fundamental particles, like the top quark, have the masses that they do is to be the principal focus of the research at the Large Hadron Collider.

Such questions may seem remote from our daily lives, but I see at least three ways that this initiative will change the way we live and think.

First, we may obtain a deeper understanding of the origins of the universe and how the fundamental building blocks of matter are assembled. Human kind's self-comprehension and our ability to understand the universe could be profoundly enriched.

Second, this agreement will have the immediate effect of advancing our scientific and technical knowledge in magnetics, computation, materials, and a host of other disciplines. The Department of Energy will invest \$200 million in the Large Hadron Collider's accelerator.

We are counting on three of the Department's national laboratories -- Brookhaven, Berkeley, and Fermi -- and U.S. industry to provide the superconducting cables, sophisticated magnets, and high purity alloys and films that will make this project a success.

The remaining \$331 million from the Department and the NSF will be used to build the massive detectors, which by themselves are \$1 billion projects being built by 4,000 scientists and engineers from 45 countries. We are using our national scientific and engineering strengths to push the technical envelope as these new detectors, computers and associated equipment are developed.

And U.S. companies and the Department's national laboratories, which are at the forefront of many of these technologies, will reap the benefits because the work we fund will be done in the United States and help us build a stronger domestic science base.

I would also like to acknowledge the importance and significance of our partnership with the National Science Foundation. Neal Lane will speak in a few moments about how this partnership will help produce the next generation of scientists and engineers who will make huge contributions to our nation's economy and society in the next millennium. The agreement we are signing today will pave the way for even larger scientific collaborations in the future.

The third way that our nation and the world will benefit from this agreement is through the cascading effect of scientific innovations. There are many examples of basic scientific exploration that have led to epoch shaping innovations. Let me give you an example.

James Clark Maxwell's work on the laws of electricity and magnetism in the 1860s led, fifty years later, to Marconi's first practical wireless transmission. And quantum mechanics, which was a radical idea when first proposed in the early part of this century, today provides the key to our understanding of atomic processes. The combination of Maxwell's Laws and quantum mechanics are the basis for the world's trillion dollar electronics industry.

A characteristic that links these important discoveries is the long time scale, running to decades, between the basic scientific discovery and its practical applications. This will also be our experience with the Large Hadron Collider. It is a safe bet that the young scientists and new technologies that will emerge from this frontier activity will provide amazing advances in the marketplace, in medical clinics, and in our daily lives.

### *International Science*

Our planet -- the blue, green and white jewel that floats through a vast cosmos -- is becoming a smaller and smaller place. Astronauts who have had the privilege of seeing this fragile and beautiful globe from outer space come back humbled and more appreciative of the need to bring nations together and work toward common purposes.

Today's agreement exemplifies that noble goal by building on the long tradition of successful international partnerships that the Department of Energy's national laboratories -- Fermilab, Brookhaven, the Stanford Linear Accelerator Center, Argonne, and others -- and U.S. universities have created with laboratories around the world.

This collaboration, enabled through today's agreement, is truly a win/win situation. It allows the international community to benefit from each other's ideas and to work at the newest frontiers of scientific knowledge.

In turn, scientific cooperation among countries can promote world peace and the development of common solutions to international challenges.

When there is a melding of ideas, cultures and scientific disciplines of the magnitude that we will experience at CERN, the solutions to great challenges -- reducing the threat posed by global climate change, finding cures for diseases, and lifting the burden of poverty -- become closer to reality.

And it will take the entire international community, all of us, working together to address these challenges. We are fortunate to have some of the world's greatest scientific talent converging on CERN and working toward common solutions that will make our jewel of a planet a better place for our children and grandchildren.

As the French author Victor Hugo once wrote, "There is nothing like a dream to create the future." With today's agreement, we are turning a dream into reality and creating a better future for everyone.

**Director Lane:**

I would also like to echo Secretary Peña's words of praise for Martha Krebs and Bob Eisenstein for heading up the DOE-NSF team that will jointly oversee the U.S. role in the project.

As is clear from our gathering here this morning, the LHC promises to expand frontiers of many kinds. Foremost, of course, is its scientific potential. The desire to discover the deepest secrets of the physical universe is beyond question the ultimate driving force behind the project.

We also know that the LHC marks a quantum leap forward for international cooperation in science and technology, and it also represents a technological challenge of enormous proportions.

Today, I want to say a few words about another frontier that the LHC offers us the opportunity to advance and explore. This frontier lies in the area of public appreciation and understanding of physics in particular and science and engineering in general. Here too, the potential for progress is both exciting and unprecedented.

According to a recent study by the Organization for Economic Cooperation and Development, virtually all of the world's major industrialized countries share one troubling trait. Interest in scientific news and events is surprisingly high, while understanding of scientific concepts and methods is disturbingly low.

On the one hand, a majority of citizens have a high level of interest in science and technology, especially when it affects their lives directly. But, when it comes to understanding scientific methods and concepts, the numbers drop precipitously, to levels on the order of one-in-five and below.

Some refer to this difference between interest and understanding as a gap or a divide, or even a barrier. I prefer to think of it in another way, as a "potential." The term potential takes on special meaning within the realm of physics. It describes a situation where one energy source is at a high level and another is at a low level. We see this in the "+" and "-" signs on the batteries that power our flashlights, not to mention the injectors at CERN that accelerate particles to velocities that approach the speed of light.

Needless to say, when it comes to particle physics, there is a great reservoir of potential we can tap to raise public awareness and understanding. Interest without question is very high. Major discoveries like the top quark and antimatter make headlines on the front pages of the world's major newspapers. Whether readers fully appreciate the significance of these breakthroughs is another matter altogether.

That is why this agreement places such a high priority on public education and outreach. Each of the U.S. detectors has named an education coordinator to its senior project management teams. You'll also see that the integration of research and education stands out as a primary objective and responsibility within the overall U.S. investment strategy - - just as it now guides NSF's programming in general. I often say that NSF is involved in everything from elementary schools to elementary particles, and it's not always clear which are more complex or more challenging.

To close therefore, let me restate that the LHC will help us to realize the potential that lies along all of these challenging frontiers. That gives us many reasons to celebrate this historic occasion. With all of you, I look forward to a lasting partnership that advances discovery, learning, and cooperation across our entire society.

Last modified 31 December 1996,