

DPF Newsletter April, 2014

By the DPF Chairline, Executive Committee, and guest writers

The DPF Executive Committee is pleased to issue the first DPF Newsletter of 2014. Many APS divisions have a Newsletter. In recent times DPF has replaced a traditional newsletter with a web-based Newsletter
<http://dpfnewsletter.org/?p=977>

and since 2014 a Facebook page DPF APS
<https://www.facebook.com/pages/APS-DPF/291390247568081>

Most news items on the newsletter page also appear as e-mail to the DPF membership via dpf@aps.org

However, on our campuses and in our labs we hear quite a few members of DPF telling us: “the problem with DPF is that it does not communicate with its members *via a Newsletter*”. We conclude that our web and FB approaches are not yet sufficiently well known, and so the return of a Newsletter. We will aim to compose and send Newsletters periodically throughout the year via dpf@aps.org. The Newsletter will also appear on our Newsletter page and FB page.

The DPF in 2014

Ian Shipsey, DPF Chair

In 2012 and 2013 the focus of the DPF was the organization and execution of the Snowmass process. Snowmass was widely held to be a success. In 2014 our focus is to harness the energy, enthusiasm and unity we achieved at the end of Snowmass on two time scales: one immediate, the other longer term. On the immediate time scale we seek to build support for the impending P5 Report and to enable the community to deliver P5’s compelling message to government with one voice (“*bickering scientists get nothing*”). To this end we have enhanced community input to P5 via the DPF/P5 sponsored P5 virtual town halls that have been deemed a success. We have had three this year so far. The next will be shortly after the P5 Report is released at the HEPAP meeting May 22/23. As part of the P5 Rollout the DPF EC is planning a community visit to Washington modeled on the outstanding success of the DPF-sponsored community visit to Washington last November to celebrate particle physics, the discovery of the Higgs, and the award of the Nobel Prize. We were overwhelmed by the warm and enthusiastic welcome we received then from congressional staffers and congressmen. We told them about the exciting recent discoveries at all three frontiers, the unity in our field, the Snowmass process, and the P5 report. We were invited to return to Capitol Hill when the P5 Report is unveiled to tell of its compelling vision for the future of particle physics. (A more detailed article about the community visit appears later in this Newsletter.)

On a longer time scale, we seek to maintain a united community for 2014 and beyond in close partnership with the DOE and NSF. This is a role well-suited to the DPF. In that regard, how does DPF stack up compared to DNP and DAP? We are talking closely with our DNP colleagues. DNP have a Divisional Meeting every year; should we do the same? Could the DPF Coordinating Panel on Advanced Detectors (CPAD) which will serve as a guardian for a national instrumentation program in a global context, be a model for all of HEP? To answer these questions and others we are designing a DPF survey and hope to release it soon. Depending upon its results a virtual town hall for follow-up will be considered.

To improve communication we have launched the FaceBook page and now this Newsletter, and to increase transparency Treasurer/Secretary Howard Haber is preparing to circulate the DPF EC minutes for the past two years. We will also advertise links to the Indico pages of major DPF EC meetings (see link above).

We have created a working group to examine, and possibly revise, the bylaws of DPF. One revision might be to include younger members of the community in the DPF EC. The members of the working group are Bob Bernstein, Yuri Gershtein, and Sally Seidel.

We have created a small working group of US leaders from the LHC experiments and key APS publishing experts, to meet, share perspectives, and look for a solution to the serious problem of publishing LHC papers in APS journals. From the APS Joe Serene, Gene Sprouse and Sam Aronson join with DPF EC members Nick Hadley, Mike Tuts, and Ian Shipsey. This committee will develop a position and then meet with SCOAP3 representatives to seek a consensus solution that is so desired by both APS and CERN.

The DPF is a large division with few prizes. We are studying the creation of Divisional Prizes based on a model from the DNP.

In addition to these initiatives there is a lot of "standard maintenance." This includes the organization of the APS April meeting from talks to travel awards, the population of prize committees, selection of APS Fellows, representation of DPF in APS, and serving ex-officio as a community representative on HEPAP and ICFA. The DPF2015 site has been selected, and dialog with DOE and NSF on funding/panels is ongoing.

The Chairline and DPF EC are eager to hear from you! Please contact any one of us.

Chair: Ian Shipsey (01/14 - 12/14) Purdue Univ

Chair-Elect: Nick Hadley (01/14 - 12/14) Univ of Maryland-College Park

Vice Chair: Joanne Hewett (01/14 - 12/14) SLAC - Natl Accelerator Lab

Past Chair: Jonathan Rosner (01/14 - 12/14) Univ of Chicago

Secretary/Treasurer: Howard Haber (01/13 - 12/15) Univ of California-Santa Cruz

Councillor: Mike Tuts (01/14 - 12/17) Columbia Univ Nevis Lab
Member-at-Large: Yuri Gershtein (01/12 - 12/14) Rutgers Univ
Member-at-Large: Nikos Varelas (01/12 - 12/14) Univ of Illinois - Chicago
Member-at-Large: Robert Bernstein (01/13 - 12/15) Fermilab
Member-at-Large: Sally Seidel (01/13 - 12/15) Univ of New Mexico
Member-at-Large: Robin Erbacher (01/14 - 12/16) Univ of California - Davis
Member-at-Large: Laura Reina (01/14 - 12/16) Florida State Univ

The Snowmass Process

Jonathan Rosner, DPF Past Chair

In 2012 the DPF decided that the time was ripe for a community-wide planning exercise to help chart the future of the U.S. high energy physics program. An organizational meeting was held at Fermilab in October of 2012, followed by a number of satellite meetings discussing physics in the frontier areas of intensity, energy, astrophysics, theory, instrumentation, accelerator and non-accelerator capabilities, computing, and communication/education/outreach. A final meeting (“Snowmass on the Mississippi”) was held in Minneapolis, July 29 – August 6, 2013. The results of this planning exercise will help to inform the P5 process, which will recommend priorities for the projects discussed in Minneapolis. For the web site of this Community Summer Study see <http://www.snowmass2013.org/tiki-index.php>.

The following recommendations were made:

- (1) Probe the highest possible energies and distance scales with the existing and upgraded Large Hadron Collider and reach for even higher precision with a lepton collider; study the properties of the Higgs boson in full detail.
- (2) Develop technologies for the long-term future to build multi-TeV lepton colliders and 100 TeV hadron colliders.
- (3) Execute a program with the U.S. as host that provides precision tests of the neutrino sector with an underground detector; search for new physics in quark and lepton decays in conjunction with precision measurements of electric dipole and anomalous magnetic moments.
- (4) Identify the particles that make up dark matter through complementary experiments deep underground, on the Earth's surface, and in space, and determine the properties of the dark sector.
- (5) Map the evolution of the universe to reveal the origin of cosmic inflation, unravel the mystery of dark energy, and determine the ultimate fate of the cosmos.

(6) Invest in the development of new, enabling instrumentation and accelerator technology.

(7) Invest in advanced computing technology and programming expertise essential to both experiment and theory.

(8) Carry on theoretical work in support of experimental projects and to explore new unifying frameworks.

(9) Invest in the training of physicists to develop the most creative minds to generate new ideas in theory and experiment that advance science and benefit the broader society.

(10) Establish a nationally coordinated communication, education, and outreach effort, supported by a dedicated team, to convey the excitement and value of our field to others.

It is hoped that the P5 panel will be able to accommodate this rich and broad set of goals within available funding scenarios.

DPF EC Meeting in Santa Cruz January 25 & Business Meeting April 6

The DPF Executive committee held its traditional kick-off meeting in January at UCSC graciously hosted by Howard Haber. The agenda and talks are here: <https://indico.fnal.gov/conferenceDisplay.py?confId=7983>

As required by APS bylaws each Division shall have an annual open Business Meeting at which the Treasurer reports on the finances of the Division. Ours was held April 5 in Savannah at the April APS meeting. The meeting provided an occasion to present certificates and pins to new APS Fellows. Some photographs of smiling new APS Fellows are at the DPF APS FB page <https://www.facebook.com/pages/APS-DPF/291390247568081>

DPF2015

The DPF Executive committee has selected the University of Michigan as the host of the next DPF meeting, DPF2015. Ann Arbor is a great location. The dates (in August) and a website for the meeting will be announced soon. Congratulations Michigan!

A Community Visit to Washington -- November 20, 2013

Pushpa Bhat

The U.S. particle physics community celebrated particle physics, the discovery of the Higgs boson, the US contributions to the discovery, and the Physics 2013 Nobel Prize on Capitol Hill in D.C., on November 20, 2013. The community visited congressional offices during the day and organized a reception at the Rayburn

House Building Foyer in the evening, hosted by the House Science and National Labs Caucus. There were nearly 300 participants at the reception -- many distinguished guests, particle physicists, various agency leaders/representatives, and at least ten members of Congress with five members making remarks from the podium. The event was a great success, gauging from the participation in congressional visits, attendance at the reception, and the numerous wonderful examples of positive feedback we have received from congressional offices, from distinguished attendees, and from within the community. The community visit and the reception event were sponsored by the DPF, the APS President's Office, Universities Research Association Inc. (URA), and Fermi Research Alliance (FRA).

Please view the slides at this link for more details:

<https://indico.fnal.gov/conferenceDisplay.py?confId=7983>

The Future Circular Collider and the upcoming SLAC and FNAL workshops

Laura Reina

On February 12-15, 2014 the University of Geneva (CH) hosted the kick-off meeting of the "Future Circular Collider Study" (FCC), a five-year international design study with emphasis on a post-LHC hadron collider with a center-of-mass energy of the order of 100 TeV in a new 80-100 km tunnel as a long-term goal. The study will also examine the option of a 90-400 GeV lepton collider, seen as a potential intermediate step, and the case of a lepton-hadron collider. At the University of Rome, where I'm spending this spring semester, the FCC initiative is a main topic of discussion among particle physicists, from seminar talks to occasional chats over coffee or lunch. Hence the idea of highlighting it in this Newsletter.

Coordinated by CERN with the scope of establishing international collaborations and future studies, the meeting started with a few introductory talks and ended with the organization of topical working groups that will address both technical and physics issues. Worldwide collaboration in all areas -- physics, experiments, and accelerators -- will be essential to reach the goal of being at CDR level by 2018. All the talks presented at the Geneva's FCC-study kick-off meeting as well as links to the organization and activities of the various working groups are available at:

<http://indico.cern.ch/event/282344/overview>

After the discovery of a SM-like Higgs particle in Run I of the LHC and waiting for Run II, many strong arguments exist to envision going to energies around 100 TeV as the most compelling step after the LHC. Independently of whether new physics will show up at lower energies, in the form of low-mass beyond-Standard-Model (BSM) particles or as indirect effects in high-scale phenomena, nothing can replace expanding the energy reach to allow direct observation. The discovery of a Higgs-like particle in Run I of the LHC has not answered more fundamental questions on the nature of electroweak symmetry breaking and the electroweak phase transition that much higher energies could directly attack. The issue of naturalness is still open and urges us to push the energy reach beyond the electroweak scale. Yet, before we

worry about costs or political issues, we need a concerted and focused effort to justify why a center of mass energy of 100 TeV would be the right choice and what this entails in terms of design and accelerator technology. Here is where the FCC study comes in.

It is crucial for the U.S. high energy physics community to get involved at all levels in this new endeavor. As stated in the summary report of the Snowmass 2013 study, "... a 100 TeV-class hadron collider ... would provide a large step in energy with great potential for new insights into electroweak symmetry breaking and dark matter. The feasibility of such a machine should be clarified through renewed accelerator R&D and physics studies over the next decade." In this context we would like to advertise the "Workshop on Physics at a 100 TeV Collider" to be held at SLAC on April 23-25, 2014 (<http://www.slac.stanford.edu/th/100TeV.html>) and "Next steps in the Energy Frontier - Hadron Colliders" at the LHC Physics Center, Fermilab, 25-28th Aug. 2014 <https://indico.fnal.gov/conferenceDisplay.py?confId=7864>

The DPF Theory Panel

Michael Dine

In 2013, the DPF formed a Theory Panel with the goal of understanding both the scientific opportunities of the next decade and the challenges involved in sustaining a first-class program in the U.S. Specifically, the panel's charge included:

- Enumerate areas of opportunity in particle physics theory research in order to set forth a vision for theoretical high energy physics for the next several years.
- Establish a range of funding needs for individual PI's to sustain an effective program (students, postdocs, travel, summer salary, equipment needs).

The panel members were Kaladi Babu (Oklahoma State), Csaba Csaki (Cornell), Sally Dawson (Brookhaven National Lab), Lance Dixon (SLAC), Steve Gottlieb (Indiana), Jeff Harvey (Chicago), Daniel Whiteson (UC Irvine), and Michael Dine (UCSC, Chair). To address these questions, the panel solicited comments and suggestions from the community, held town meetings at the BNL and KITP pre-Minneapolis workshops leading up to the main meeting in Minneapolis, and held two parallel sessions and a plenary session in Minneapolis. Our conclusions are presented in the Snowmass (Community Summer Study) report and are available on line. We made presentations of our findings to HEPAP and P5.

In our report, we noted that theory is an essential part of the particle physics enterprise. Theory defines many of the questions and issues in the field, and helps set direction for the experimental program; it provides crucial support for the experimental effort, and, finally, it is an area in which the U.S. has historically been, and remains, a leading force – often *the leading* force.

Our basic conclusions and recommendations can be simply summarized: The U.S. should maintain a vigorous research effort in theoretical particle physics, ranging from perturbative and non-perturbative QCD studies, to collider phenomenology, to model building, cosmology, and research in foundational areas. We noted that there have been severe cuts in NSF funding of theoretical High Energy Physics -- 10.6% -- though cuts to other programs were even more severe, averaging 12%. At the DOE, the move of funding from research to projects has particularly impacted theory, as few theory activities fall within a project designation. We expressed concern that postdoc and student support are particularly vulnerable: hiring a research associate requires some minimum funding level, and many groups are likely to find their funds fall below this minimum. Additional cuts to graduate student support will lead to shrinking numbers of individuals admitted to study particle theory, as well as a longer time to Ph.D. for those who remain.

Among possible remediations, we suggested the establishment of theory “networks”, modeled very loosely on comparable structures in Europe, in which several institutions would make proposals for three year funding, supporting students, postdocs and travel for joint research efforts. Other models to infuse additional funds into theory have been put forth by the DOE Committee of Visitors.

Since our report, and presentation to P5 in December, it has become clear that the anticipated long term impacts on the postdoc population are already occurring, and we may be witnessing a significant shrinkage of this vital component of the field. Such a collapse seriously threatens not only U.S. leadership, but the existence of a viable theory program in the U.S.

Links:

Theory panel web page and report:

<http://www.snowmass2013.org/tiki-index.php?page=Theory+Panel>

COV report:

http://science.energy.gov/~media/sc-2/pdf/cov-hep/2013/HEP_COV_2013_Report.pdf

Correction: An earlier version of this newsletter had mistakenly implied that hep theory suffered the largest cut in NSF funding compared to all other disciplines and misstated the affiliation of Dr. Babu.