

DESY PRC 65 Recommendations

1. News from the Laboratory

The news from the laboratory was presented by Rolf Heuer. The Directorate consists of the Chair of the Boards of Directors, the Director in charge of High Energy Physics and Astroparticle Physics, the Director of the Accelerator Division, the Director in charge of Photon Science, and the Director of Administration. We expect the new Chair to take over from Albrecht Wagner by the end of this year or spring next year. The appointment of the Director in charge of High Energy Physics and Astroparticle Physics is expected this summer.

PETRA III made an enormous progress and the whole project is on time and on budget. Regarding XFEL, Russia officially committed to contribute 250M Euro and various in-kind contributions from other countries are expected. The project is in good shape technically, but political and administrative problems will likely cause a delay. Ground breaking is expected this fall at the earliest. FLASH made a new record, reaching 1 GeV. The beam availability of 97% provided a good demonstration of running a superconducting linac.

The Helmholtz Alliance “Physics at the Terascale” has started to work with a successful Kick-off meeting at Hamburg with about 500 participants. In the management, one of the Scientific Coordinators has changed. The first phase of recruitment of Fellows has been completed in the theory sector and is ongoing in the experimental sector. There has been a good process in new appointments in the area of particle physics phenomenology, theoretical astroparticle physics, accelerator physics, and young investigator positions.

Although the DESY budget in particle physics and astroparticle physics for the current funding period is tight, DESY can profit from additional funding opportunities in Germany and Europe. They include a BMBF fund for improving Germany’s visibility at CERN, and EU funds for superconducting cavity, detector, and accelerator R&D.

The second five-year cycle within the Helmholtz Association for the Program Oriented Funding covers the period between 2010 and 2014. The proposal for this cycle is due November 30, 2008. The proposal will be reviewed spring 2009 and decision will be made summer 2009.

2. HERA Experiments

- **Beam Polarization**

The PRC congratulates the polarization team for their impressive progress on understanding the cavity LPOL data and systematics and the TPOL simulation.

The team now needs to complete the assessment of systematic uncertainties and to integrate the cavity measurements into the final polarimeter analysis. The PRC is concerned that the analysis effort still lacks scientist resources for a timely conclusion on the final uncertainty determination and the PRC concludes that without additional effort in the near future the final systematic uncertainty will

likely remain at 3.5%, about a factor of 2 worse than aimed at for precision electroweak physics.

- **H1 and ZEUS**

The PRC congratulates the H1 and ZEUS collaborations for the continuous production of high quality physics results and for the combined H1/ZEUS analyses including impressive results of PDF fits. The PRC is impressed with the H1 collaboration's preliminary FL measurements and is looking forward to hearing the ZEUS's measurements at PRC66. The PRC commends the experiments for making good progress on dismantling the detectors. Both the H1 and ZEUS collaborations have defined priorities for physics analyses and plan to publish high priority analyses in a couple of years. We recommend that the laboratory continue the high level of support for the collaborations to guarantee excellent physics results and publications in the coming years. These include support of their efforts in securing sufficient Grid computing resources for Monte Carlo production, especially in 2008/9. Although the physicist resources to complete important physics analyses appear to be sufficient, the PRC recommends that the experiments and the laboratory pay special attention to the personpower development. To mitigate resource issues, the PRC encourages the collaborations to motivate their institutes to continue harvesting physics from the HERA data and encourages initiatives to strengthen links to the LHC.

- **HERMES**

The PRC congratulates the HERMES collaboration for the steady stream of high-quality physics results and for solid progress on data analysis to understand the performance of the recoil detector. We are pleased with the collaboration for establishing a plan for their management and clear analysis and publication priorities for the next few years. The PRC recommends that the collaboration's focus be on transitioning from understanding the detector performance to physics analysis of recoil data and that the laboratory continues the high level of support for the collaboration in order to guarantee excellent physics results and publications in the coming years.

3. LHC Experiments

- **ATLAS and CMS**

The PRC notes that both the ATLAS and CMS groups at DESY have reached the "critical mass" which allows for major contributions to each experiment. Important contributions to both experiments have already been acknowledged by the ATLAS and CMS managements. The ATLAS and CMS groups have a good and fruitful collaboration with local Universities in Hamburg and Berlin. The PRC congratulates the LHC groups at DESY and the laboratory management for these achievements. However, the PRC is concerned that with high M & O costs and a tight travel budget, the laboratory may not be able to support the necessary expertise on the CERN site during the commissioning phase of the experiments. We recommend that concerning the pre-sLHC effort, both experiments focus on their currently committed areas and do not expand these further.

- **National Analysis Facility**

DESY has many excellent opportunities with the ATLAS and CMS experiments including involvement in physics analysis, high-level trigger and data-acquisition systems, software, commissioning and technical coordination, forward detectors and their physics, computing with a Tier-2 center, and the sLHC detector upgrades. DESY now has another opportunity, “National Analysis Facility” (NAF), as part of the strategic Helmholtz Alliance. The goal is to provide best possible infrastructure and tools to enhance analysis capabilities and to create synergies among German scientists at the LHC and ILC. Initially the facility will be used for the ATLAS and CMS scientists in the start-up phase. The PRC strongly supports the NAF as a powerful extension of early analysis capabilities for the German LHC and ILC community.

4. ILC

- **SiLC**

SiLC continues to be a very useful collaboration for drawing together R&D interests for Si-tracking at the Linear Collider. The R&D results being obtained will provide essential information during the initial LOI phase currently being addressed by the various detector concept groups. The PRC congratulates the SiLC collaboration on the successful production and initial testing of new sensors from HPK, and applauds the activities to develop contacts with new vendors to be qualified as producers of new generations of sensors. The PRC recognizes the progress made towards a high degree of the front-end electronics integration and looks forward to results from the integrated systems from the upcoming test beam runs. The PRC recommends the SiLC collaboration to produce timely analysis and results from the DESY/CERN test beams in 2008 to feed into the preparation of LOIs.

- **TPC**

The PRC congratulates the LC TPC collaboration for making a good step forward. The collaboration produced convincing new results and has grown worldwide. The PRC recommends the collaboration to get a large prototype detector going. There is still a lot to do to make it work and to learn about operations, calibrations, data corrections and field corrections. The PRC recommends that the TPC collaboration puts more effort into simulations and correction tools. These will allow the collaboration to study effects of endplate thickness on calorimetry, to simulate various detector conditions, and to simulate physics performance for detector choices.

5. Astroparticle Physics

The PRC recognizes that about 50% of IceCube is installed, faster than expected, and IceCube physics analysis has begun. The PRC also notes that DESY’s hardware contribution will be complete in 2008 and DESY’s participation in Baikal finishes in 2008. DESY is leading the R&D on acoustic detectors on IceCube. The PRC looks forward to definitive results from test data taken in the end of 2007 at PRC66. The DESY group contributes significantly to the physics analysis and is leading point

source analyses, especially with multi-messenger techniques. The PRC acknowledges that with strong participation and leadership roles in Baikal, Amanda, IceCube, and IceTop experiments and Acoustics detection development, DESY's astroparticle physics activities have been very successful and internationally visible. With termination of Baikal and completion of IceCube construction in the near future, DESY wants to redirect resources towards a major next generation gamma-ray observatory such as CTA to expand the multi-messenger technique and secure DESY's leading role in astroparticle physics in the next decade. The PRC strongly supports this plan. The PRC recommends that the analysis of IceCube data should have the first priority and the engagement in CTA should be firmly established. The PRC underlines the importance to study the performance of acoustic detectors in IceCube.

6. ALPS

The ALPS group has modified its proposal a couple of times since the original proposal reviewed by the PRC in Feb. 2007. The current focus is no longer the test of the PVLAS signal, but the general search for light particles. The immediate steps to exceed the sensitivity of competing experiments involve increasing the laser power by installing a cavity in the magnet with a new partner, the MPI for Gravitational Physics (Albert Einstein Institute), and installing a better photon detector. The PRC recommends to proceed rapidly with the immediate improvements. In the more remote future, ALPS plans to install phase shifting plates and to increase the laser power inside the cavity up to ~10kW in order to increase the mass range of new particles. The PRC notes that although installation of the phase shifters appears to be easy to achieve improvement, it would need early study of technical implications on the operation of the laser system. The PRC is concerned about lacking physicist resources on the DESY site, and encourages the ALPS group to actively seek Ph.D. students and postdocs working full-time on the project. The PRC also encourages negotiations with the Albert-Einstein institute on the conditions to install and operate the high-power cavity. The PRC welcomes on-going collaboration with theorists to explore the various scenarios in reach of ALPS and for the interpretation of the data.

7. OLYMPUS (Internal Target Experiment at DORIS)

The PRC notes that discussions of the last months showed that there are presently no "showstoppers" identified in running DORIS or installing and operating OLYMPUS (the former BLAST detector) in parallel with the DORIS light source. Currently the OLYMPUS experiment has more than 30 physicists from 10 institutions in Germany, Italy, Russia, U.K. and U.S. and about 100 people are needed to execute the experiment. Since there is a window of about 3 years between 2009 and 2012 opening up for many other groups to join this experiment, the PRC believes that formal encouragement by the laboratory on the OLYMPUS experiment at this time will be very helpful. The PRC strongly encourages the collaboration to proceed and prepare a detailed proposal with a formal collaboration and details of funding by summer 2008.

8. The Second 5 Year Plan

The PRC had a first discussion on the DESY roadmap in preparation of the second 5 year cycle of the Program Oriented Funding of the Helmholtz Association. In particle

physics, the theme is the Terascale physics at the energy frontier with HERA (data analysis and knowledge transfer to LHC), LHC (operations, data analysis, and upgrades), ILC (accelerator and detector R&D), and theory. These are presently all embedded within the Helmholtz Alliance. In astroparticle physics, the program consists of IceCube data analysis, R&D on acoustic detectors, and the next generation gamma-ray observatory such as CTA. Possible projects outside POF include ALPS upgrades and OLYMPUS. The PRC strongly supports the proposed DESY roadmap. Detailed discussions have to await clarification of boundary conditions such as starting values for funding. The PRC will continue the discussion with the DESY management via intermediate phone meetings to help prepare the final draft. The PRC will review the final draft at PRC66.