

## **DESY PRC 66 Recommendations**

### **1. News from the Laboratory**

The news from the laboratory was presented by Albrecht Wagner. The second five-year cycle within the Helmholtz Association for the Program Oriented Funding (PoF) covers the period between 2010 and 2014. The proposal for this cycle is due November 15, 2008 and will be reviewed in January 2009. The draft proposal by DESY on particle and astroparticle physics will be reviewed by the PRC this week (the PRC had given input to the DESY team on the proposal via two conference calls) and be polished by the DESY team. The revised proposal will then be reviewed by the Scientific Council on October 14<sup>th</sup> together with the Photon Science proposal. FLASH operation for photon science and machine development is running nicely, including an ILC dedicated high current machine study run. The electro-polishing technique applied by industry has been a great success with good results towards high gradient cavity production for XFEL. The founding document for XFEL will most likely be signed in February 2009. DORIS started operations very smoothly after a long shutdown for the PETRA installation. PETRA III construction is on schedule and within budget. First beams at PETRA III are foreseen by end of this year. DORIS could shutdown anytime after 2012.

### **2. HERA Experiments: H1, ZEUS and HERMES**

The H1, ZEUS and HERMES experiments are at their peak in harvesting physics from the HERA data. The exploitation of the HERA data is of central importance for the next PoF period. The importance of HERA results for other communities, especially LHC, becomes more and more visible. The PRC congratulates all of the three collaborations for a number of achievements. They include the continuous production of high quality physics results, defining priorities for physics analyses, and planning to publish high priority analyses through 2014 with a detailed publication schedule. The PRC commends strong H1/ZEUS working group activities on combining their results, and HERMES's great progress on the recoil detector. The PRC notes that all of the experiments plan to reprocess data with the final calibrations by mid 2009. They appear to have sufficient Grid computing resources for Monte Carlo simulation for the final results, and appear to have enough physicist resources to complete important physics analyses. The polarization task team is making steady progress and they hope to improve the precision from 3.5% to 2% by summer 2009. The collaborations are planning long term data preservation and the PRC strongly supports their plan. The PRC recommends that the laboratory continue the high level of support for the collaborations to guarantee excellent physics results and publications in the coming years. The PRC also recommends that the laboratory and the collaborations help experiments' important collaborators to be visible in the particle physics community.

### **3. LHC Experiments: ATLAS and CMS**

Both ATLAS and CMS groups have reached the critical mass with a number of experienced physicists in each group. This allows both groups to make major contributions to the experiments. The PRC congratulates both groups for very good and fruitful collaboration with local universities in Hamburg and Berlin, steady consolidation and progress on the projects in which DESY is committed, and very visible contributions to the experiments. Current detector and computing efforts by both groups (including triggers, monitoring, and forward detectors) are coherent and are based on DESY's core capabilities. However, the PRC is concerned that although it has increased, the travel budget may not be sufficient to support the necessary expertise on the CERN site during the commissioning phase of the experiments. Regarding the next PoF period between 2010 and 2014, both groups plan to intensify work on current projects such as triggers, forward detectors and computing, and to emphasize physics analysis with early data. The PRC supports these plans. The groups also plan to engage in new upgrade projects. The PRC recommends the groups to identify an upgrade project such that they can work closely with university groups in the frame of the Helmholtz Alliance "Physics at the Terascale".

### **4. ILC: Accelerator and Detector**

The PRC commends the enthusiastic and balanced investment that DESY continues to make in the ILC accelerator and detector programs. Overlap exists between detector development needs for ILC, sLHC and XFEL. Coherent R&D should be encouraged and supported in these areas. The PRC congratulates DESY for third party funds such as ILC-HiGrade, EUDET, EuroTeV, Helmholtz Alliance, Helmholtz junior research group, an Emmy Noether research group, a Marie Curie Fellow, and a Joint Helmholtz-Russian research group. A new position at University of Hamburg will strengthen connection between accelerator and experiment, and between universities and DESY. The PRC commends support by DESY of the wider ILC community for major infrastructure. The PRC encourages DESY to continue to have representation and discussions with entities developing alternative LC accelerator technologies.

### **5. Theoretical Particle Physics**

With a broad and timely spectrum of research topics and with lectures, schools, workshops, and conferences the DESY theory group plays an important role for the community. The group has a strong impact on theoretical particle physics in Germany and beyond. Its four main topics are collider phenomenology, string theory, lattice QCD, and particle cosmology. The group has been producing internationally visible scientific results in all four topics. The PRC recognizes that within a short period, the string group has already become visible internationally. The PRC also acknowledges that there is close collaboration with the University of Hamburg in the fields of string

theory and mathematical physics and with Humboldt University in lattice theory. The group has provided important service to the community via workshops, schools, and participation in the Helmholtz Alliance. The PRC acknowledges that the DESY theory group is rooted in the experimental program and integrated with local universities. However, the connection with experiment is presently weakened since the collider phenomenology group has not yet been reestablished after the retirement of its former leader. The PRC, thus, recommends to push for a quick reestablishment of the collider phenomenology group at DESY Hamburg. In addition, the PRC recommends the whole DESY theory group to strengthen the connection to the experimental community through the Helmholtz Alliance, especially in the area of beyond the Standard Model physics. The PRC also recommends the theory group to define the role of theoretical astrophysics.

## **6. Experimental Facilities**

With a core group of experienced people in the development, coordination, management, and construction of detectors and with infrastructure resources such as testbeams, FLASH, and remote control centres which are difficult or impossible to realise at a university, DESY can and must play a unique and significant role in the development and construction of detectors, especially large scale and large risk detectors. There are many successful examples by DESY in the past. Currently DESY is playing this role for detector components for the ILC successfully, and at small scale for the LHC. The virtual laboratory for detector developments, a project office for an ILC detector, and an analysis centre will strengthen DESY to continue its role as the leading German high-energy physics institution for the benefit of DESY and more importantly for the benefit of the German particle-physics community. The PRC strongly supports these new initiatives. With these, DESY now covers the entire scope of needs of the particle physics community from accelerator technology development, accelerator beam tests (FLASH), detector technology development, detector beam tests, computing/software and data analysis centre.

## **7. Computing**

The PRC congratulates the IT and DV teams for the successful implementation of the Tier-2 centre for ATLAS and CMS, and the National Analysis Facility (NAF) for significantly contributing to LHC computing needs (Tier-2) and for serving the German community through NAF, which has been founded in the framework of the Helmholtz Alliance. The immediate future task is the extension of the Tier-2 to support the LHCb community and the further extension of the NAF. The PRC acknowledges the close relation to the user community established via the Grid project board and the NAF user committee. The DESY computing groups have extrapolated the current needs to the future needs for Tier-2 and NAF resources to be included in the next PoF period. 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. The PRC sees a critical period when Alliance funding

of personnel for operation of the NAF ends and recommends that DESY foresees mechanisms to ensure the continuation of its commitments towards the NAF.

## **8. Astroparticle Physics**

The PRC congratulates the IceCube team for very efficient detector fabrication, installation, and smooth operation with remarkable quality. The highest priority for the next PoF period will be the scientific exploitation of IceCube. The PRC recommends that the Zeuthen group continue its contributions to physics analysis, building upon the present high level of international visibility. DESY has started activities for the coming Gamma ray telescope CTA. As Germany is strongly involved in ground based gamma ray observations DESY should play a major role in CTA. The PRC recognizes that this will require additional funds exceeding the normal PoF budget and encourages DESY to apply for additional funding. The investigation of parameters of the South Pole ice for acoustic neutrino detection turned out to be quite complicated. The IceCube collaboration will deploy a calibration source in the coming season 2008/09. As the Zeuthen group has the lead in this activity it should push for this campaign being followed by a final data analysis until end of 2009, which can serve as the basis for simulation studies of a future experiment design. The research program for the next 5 years at DESY and FZK are coherent and complementary.

## **9. OLYMPUS**

The Olympus collaboration with 15 institutions and more than 50 physicists formulated a proposal of one definitive experiment, representing the best possible method to resolve the discrepancy between recoil polarization and Rosenbluth measurements of the proton elastic form factor ratio. The experiment could start in summer 2010 and end in 2012 with about 9 months of running time. Therefore, provided necessary funding can be found, the PRC proposes to support the experiment and recommends the lab management to provide necessary support to execute the experiment in a timely manner.

## **10. ALPS**

The PRC acknowledges that the ALPS collaboration actively sought and found students and a postdoc working full-time on the ALPS experiment. The PRC also congratulates the DESY team for their experimental setup. The PRC welcomes ongoing collaboration with theorists to explore the various scenarios in reach of ALPS and for the interpretation of the data. The PRC notes that the remaining issues with the optical cavity and limited laser power are associated with contributions from external institutions. ALPS hopes to be able to make a competitive measurement by spring 2009. Despite the large delays compared to the original schedule, the PRC is looking forward to seeing physics results around the time of the next PRC meeting.