

# DESY PRC 72 Recommendations

(Final Version – 19 January 2012)

## OLYMPUS

The PRC congratulates the collaboration for its enormous progress since the last meeting. That includes

- solving the problems with the target cell heating
- having test beam results for basically all detector components apart from the GEM tracker
- Finalizing the detector installation and rolling the detector into its final position.

The DAQ, trigger and slow control are fully operational. First detector system integration and commissioning was performed during DORIS service weeks

During the beam checkout it was realized that the wire chambers and their HV boards had problems. The wire chambers had noise in the 10 MHz range and the HV boards did not keep the HV. For the later problem a solution was already found by redesigning the HV boards. The problem with the noise in the wire chambers needs to be solved as soon as possible. This problem makes the GEM tracker more important, therefore the collaboration should make any effort to finalize the detector and bring it as soon as possible to DESY, so it can get tested with beam and integrated into Olympus.

As not yet all subsystems could be commissioned and no elastic events have yet been identified, the PRC recommends granting Olympus additional beam time during DORIS service weeks if this is compatible with the current DORIS schedule.

Because of the short time scale of the experiment it is also extremely important that the following machine issues are tested as soon as possible

- Top-off mode for DORIS
- increase the luminosity to the promised one
- careful tuning of the beam and collimators through the IR to decrease beam induced backgrounds

The PRC strongly recommends the collaboration develop a plan for the important measurements, i.e. magnetic field scan, run positrons, electrons in both helicity states as soon as possible to understand potentially different backgrounds in each of the settings.

The PRC recommends continuing to push the offline analysis software for OLYMPUS, since a fast offline analysis will be critical for the quality assurance of measured data in a rather limited time window.

At the next PRC meeting the collaboration should present first results from the January beam time as well as an evaluation of the systematic uncertainties to check that Olympus can reach the anticipated 1%.

The PRC further recommends continual support from the lab, as it is critical for the success of the experiment.

## **FCAL**

The PRC heard about significant progress made by the FCAL group since the last review in 2009. The detector designs have been validated both for ILC and CLIC in a consistent manner. The PRC particularly congratulates the FCAL group on the successful beam tests performed in 2010 and 2011 using several key components like the GaAs BeamCal sensor developed in the collaboration. The PRC is also impressed by the beautiful spin-offs of the R&D by the group like the pCVD sensors which are used as Beam Halo Monitor at FLASH, Beam Condition Monitor in CMS and for the LHC machine.

The PRC requests a more detailed schedule, including milestones, for the design, production and testing of prototype calorimeters at the next PRC. The PRC urges the FCAL collaboration to review the system requirements and the evaluation of estimated systematic errors on beam parameters in close consultation with the accelerator developers

## **THEORY**

At this meeting the PRC reviewed DESY theory's activities in particle physics phenomenology. The two phenomenology groups at DESY Hamburg and DESY Zeuthen cover a wide spectrum of physics from QCD studies and Standard Model processes to various extensions of the Standard Model. Particle physics phenomenology clearly represents and should represent a core activity of the theory group at DESY.

The phenomenology group at Zeuthen is very visible in precision calculations for deep-inelastic scattering and LHC, and in fitting parton distributions. Maintaining the strength of the Zeuthen theory phenomenology group in view of possible personnel developments is considered as vital.

The PRC is impressed by the development of the DESY Hamburg phenomenology group in the area of Higgs physics and physics beyond the Standard Model, which has recently been strengthened by two staff appointments (Reuter, Weiler). We encourage a broad approach to model building and testing. The group now is well positioned to play the leading role in BSM phenomenology in Germany.

The group is in contact with the ATLAS and CMS groups at DESY, and opportunities for regular interactions should be exploited as much as possible.

The PRC recognizes the strong involvement of DESY particle phenomenology in organizing workshops and teaching, and in national and European science networks. We see this as an important aspect of DESY's role in the particle physics community.

## **CMS**

DESY CMS is making strong contributions in detector operations, upgrades and computing. The upgrade work proceeds on track with the new LHC schedule.

The reorganization of the physics analysis effort we saw in the last PRC is bearing fruit and many visible new results have been produced. Conference results and papers have been produced in all areas of involvement. It is particularly good to see PhD theses being completed. That there is a marked increase in the number of PhD students is also a very good development.

The CASTOR detector has been calibrated to the level thought to be usable for energy flow. Radiation damage has been assessed and plan of repair and deployment made. Internal CMS approval of these plans is in progress. We are looking forward to the first CASTOR physics results in the near future.

The Beam Condition Monitor is a small but highly effective and visible contribution of DESY, not only to CMS but to LHC. We recommend continuing this effort at Zeuthen.

We congratulate the DESY CMS group for their considerable accomplishments.

## **ATLAS**

DESY ATLAS continues to make strong contributions in detector operations, upgrades and analysis. There has been a successful commissioning of ALFA; we are looking forward to physics results with 2011 data. DESY will likely join the SCT group. In this case, it is important to have one postdoc stationed at CERN for this effort.

In analysis there have been many contributions that resulted in papers and conference results. We note that several key people in SUSY analyses have moved to other institutes which may lead to a shift of emphasis of topics in the future. In this context it is important to pursue a new YIG at Zeuthen to replace a position vacated by U. Husemann.

In the upgrade area, DESY ATLAS has given infrastructure support for IBL test beam activities. DESY's contribution of EuDet telescope and event reconstruction, among other things, are very much appreciated within ATLAS. The PETAL project proceeds well with enough manpower and on target.

We congratulate the DESY ATLAS group for their considerable accomplishments.

## **COMPUTING**

Tier-2:

The PRC is very pleased with the performance and high international visibility of the Grid infrastructure for High Energy Physics (Tier2) at DESY. The PRC welcomes the detailed report specifying required services and resources, which had been distributed after the last PRC and was subject to a telephone conference in August.

PRC members pointed out that DESY pledges as they were given for 2011 underestimate the real DESY contribution. The PRC is happy to see that an agreement on a fixed fraction of the overall Tier-2 resources has been achieved and was taken as the basis for the pledges towards the WLCG for 2012.

The PRC notes that there is a severe problem with Tier-2 resources for both ATLAS and CMS provided by the German universities in the year 2013 and beyond, because funding by the Helmholtz Alliance "Physics at the Terascale" comes to an end in 2012. The PRC recommends that DESY should play an active role in coordinating the German Tier-2 resources, and, together with the funding bodies, find a way to preserve the successful structures set up within the Alliance to ensure sufficient Tier-2 resources allowing for significant contributions by the German universities.

NAF:

The PRC is pleased that the DESY internal GRID center review committee has evaluated the needs for the NAF, and made recommendations for the period through 2014 as a part of their report. It has not been clear to the PRC, however, what the exact status and plans for the implementation of these recommendations are. Indeed we have the impression that some of the recommendations, particularly in the area of support of interactive computing, will be difficult to implement given the current manpower available at the NAF. The PRC recommends that the experimental groups, particularly the DESY CMS and DESY ATLAS groups, and IT discuss the committee recommendations and together make a workable plan for the NAF for the next few years based on the recommendations. The PRC looks forward to hearing the outcome of the discussion at the next PRC meeting.

## **Detector Lab Proposal**

The PRC strongly supports the initiative to construct and operate a new detector laboratory at DESY Hamburg to make major contributions to the upgrades for the ATLAS and CMS detectors at the Large Hadron Collider, and for GSI to make important contributions to the ALICE experiment.

The proposed facilities will allow Germany and the Helmholtz Association to continue playing a major role in these leading experiments for the next decade.

The PRC views the creation of the new facilities as a critical element in the coherent exploitation of major scientific opportunities in particle and nuclear physics by German laboratories and universities.

The PRC notes the strong support that this proposal has received from the CERN management, and from the managements of the ATLAS and CMS experiments.

## **ZEUS**

The PRC is very satisfied with the recent progress and congratulates the ZEUS collaboration for its successful presentation of physics results at conferences and the preparation of six new papers since the last PRC. Progress in all areas follows the path presented to the PRC earlier. The PRC explicitly acknowledges the large number of active students and the large number of analysis topics allowing a thorough exploitation of the HERA II data.

The PRC is pleased to see that the transition to the common data format is now accomplished. The PRC is looking forward to reading the document defining the future structure of the collaboration which is under preparation.

The PRC encourages DESY to maintain its high level of support during the coming years.

## **H1**

The PRC is pleased to see that the H1 experiment continues to be well on track. Eight new publications, two new preliminary results and final results of the searches are an impressive harvest since the last PRC. There are about 25 more analyses, most of which will be published. Highest priority should and is given to the combined results with ZEUS.

The PRC congratulates H1 for their dedication to the physics analysis and its publication and recommends keeping a close monitoring on the convergence of the ongoing analyses.

It is vital that support from DESY is adequately continued, notably financial support for eastern collaborators and technical support from IT, e.g., for the MC production team.

## **HERMES**

The HERMES collaboration is congratulated for their continuous progress producing high impact results and papers. This is well recognized by the community, receiving still a high number of talks at conferences. It is especially nice to see that both the technical publication on the recoil detector as well as the first physics publication on DVCS utilizing the recoil detector are in first circulation in the collaboration.

The collaboration has started to think about a new structure, involving all active people independent of their career level, which is a very good idea. This new structure should be implemented as soon as possible. Prioritizing analysis topics is extremely important and welcomed by the PRC as it will ensure that the most relevant analyses will be finalized.

For the next PRC the collaboration should show a plan how the new collaboration structure is implemented.

We recommend that DESY continues the highly appreciated support of the collaboration to extend the term for Postdocs and PhD student.

### **Proposed PDF Project**

Over the years both H1 and ZEUS collaborations have built up a very strong expertise in PDF fitting. A very active and visible effort exists to determine parton densities from HERA data in the context of HERA combined working group. This effort in the current form will need to continue at least until final relevant HERA combination is published and used in a “final” fit.

Many of the people in this collaborative effort are also CMS or ATLAS members. They make a study group on PDFs more visible by comparing the LHC results to HERA derived PDFs in publications, and they are instrumental in doing the first PDF fits that use LHC data as well as HERA data. Many (but not all) of these people are at DESY. There is a pool of expertise as well as a wealth of software tools that have been built up over the years by the experimentalists at HERA on PDF fitting. In particular, the HERAFitter is a significant effort of many people and represents a very good development for the community. The fact that the same people are involved in LHC in the areas relevant to PDF fitting is a clear opportunity that DESY, as well as the wider HEP community, should profit from.

The PRC strongly recommends that the current effort should be kept up and that DESY should make sure that expertise is not lost in the next few years as HERA finalizes its results and “final” HERA-only fits come out.

The PRC welcomes the presented initiative to start a collaborative study group on PDF determination from HERA and LHC data. The PRC encourages the involved collaborators to proceed with a more detailed proposal with concrete set of defined goals, scope, structure and resources. The PRC looks forward to receive such a proposal in the near future with a list of key members responsible for this effort clearly identified.

## **HERA Data Preservation**

The PRC acknowledges the efforts being performed to commission all aspects of the future data format (common ntuples). The leading role of the DESY groups in the world-wide data preservation project is acknowledged by the PRC.

The PRC is satisfied to see a clear plan of completion for the long-term preservation of the ZEUS data ensuring the possibility of data analysis beyond the year 2014. For the Zeus collaboration, it is vital to resolve the remaining worries about the long-term life-time of the envisaged virtualised system.

The data preservation task is now the main computing project at H1. Relevant manpower at H1 is installed and the validation project fully up and running.

A plan how to preserve the HERMES data was presented. The PRC recommends strongly to not base the data preservation on the Adamo format, but to convert the micro-DSTs to root-trees.

In general, the PRC is pleased to see that there is a close cooperation within the HERA experiments and with the DESY-IT group. The PRC recommends that DESY provides the requested support to ensure long-term data access and usability.

The PRC would like to hear the progress of the data preservation project at the next PRC meeting.

## **ASTROPARTICLE (IceCube, CTA)**

IceCube:

The status of IceCube's operation and data analysis was presented in the plenary session. Data taking with the final detector configuration started in May 2011 with a performance better than expected in terms of sensitivity as well as angular and energy resolution. The DeepCore extension extends the reach to lower energies. The detector uptime is excellent, reaching 99%. The number of IceCube publications has strongly increased. Markus Ackermann, who gave the plenary presentation, recently joined the DESY IceCube group. He was appointed to act as IceCube's physics coordinator and will thus strongly contribute to the visibility of DESY.

CTA:

The status of the CTA experiment and other astroparticle activities were presented in the closed session by Stefan Schlenstedt. Germany is playing a leading role in CTA. In the preparatory phase, DESY contributes a mid-size telescope prototype structure as well as electronics, concentrates on array control software, participates strongly in the MC production and sensitivity studies and is engaged in the analysis preparation. During the construction phase starting 2014, DESY plans to contribute the mid-size telescope array and to act as the array control centre as well as a mirror data centre.

In addition to CTA as a common activity, DESY is engaged in the analysis of essentially all high energy gamma ray telescope data as well as of data from the FERMI satellite. Astroparticle activities at DESY are supported by the newly founded Astroparticle Helmholtz alliance and the Berlin Brandenburg cluster, which adds important support by astroparticle theory.

The PRC gave the following recommendations on astroparticle physics:

DESY should take a leading role in the Helmholtz Alliance on Astroparticle Physics. In IceCube, DESY should take an active role in further improving the turn-around time for data reconstruction and analysis. Progress on a Tier 1 centre should be reported at the next meeting.

In CTA, DESY should keep its strong hardware involvement and continue its simulation and physics involvement.

It was suggested to discuss plans of astroparticle physics at Zeuthen at the fall PRC meeting (74.PRC) in Zeuthen.

## **ALPS**

The PRC is looking forward to reading the White Paper on the physics cases and detailed technology relevant for ALPS II. This is expected to be ready by the time of the next PRC and the material should be presented in the open session. The ALPS II TDR should be ready by summer 2012 and could then be reviewed by the PRC with the help of additional experts to be identified at the next PRC meeting.