

Minutes of the 58th Meeting of the PRC

DESY October 28th and 29th 2004

PRC members present:

H. Blümer (FZK), J. Brau (Oregon), R. Forty (CERN), U. Gensch (DESY), R.D. Heuer (DESY), W. Hollik (MPI-Munich), Y.K. Kim (Chicago), R. Klanner (DESY), T. Lohse (HU-Berlin), J. Mnich (Aachen), L. Rolandi (CERN,Chairman), N. Saito (Kyoto), B. Spaan (TU Dresden), J. Timmermans (NIKHEF/CERN), D. Trines (DESY), A. Wagner (DESY), J. Stewart (DESY,secretary), U. Schneekloth (DESY,HERA experiment coordinator).

Non PRC members attending closed session items:

HERA F. Willeke (DESY), E. Gianfelice-Wendt (DESY).
Pol2000 R. Fabbri (NIKHEF), T. Behnke (DESY), B. Zihlmann (Gent).
Representatives from the Experiments:
H1 M. Klein (DESY), T. Greenshaw (Liverpool), C. Diaconu (Marseille),
E. Perez (Saclay), D. Pitzl (DESY), V. Chekelyan (MPI-Munich).
ZEUS R. Yoshida (ANL), R. Carlin (Padova), E. Gallo (INFN Firenze),
S. Chekanov (ANL).
HERA-B M. Medinnis (DESY), J. Spengler (MPI-Heidelberg),
M. Mevius (DESY), A. Zoccoli (Bologna).
HERMES E. Aschenauer (DESY), D. Hasch (Frascati), P. Di Nezza (Frascati),
B. Zihlmann (Gent).
AMANDA, Baikal, IceCube
C. Spiering (DESY),R. Wischnewski (DESY), S. Schlenstedt (DESY).
R&D for TESLA Detectors:
F. Sefkow (DESY).
TPC T. Behnke (DESY), R.D. Settles (MPI-München), P. Colas (Saclay),
V. Lepeltier (Orsay).
Forward Calorimetry
W. Lohmann (DESY), H. Abramowicz (Tel Aviv), L. Zawiejski (Cracow),
W. Wierba (Cracow), N. Shumeiko (Minsk), W. Lange (DESY),
I. Minashvili (Dubna).
External Reviewer:
J. Gayler (DESY emeritus) for Forward Calorimetry.
U. Koetz (DESY emeritus) for TPC.

The PRC received the following documents:

Update Reports from Existing R&D projects:
PRC R&D 01/03 update 03(04)
PRC R&D 02/01 update 02(04)
PRC R&D 02/01 update 03(04)

Agenda:

Open session. October 28th 2004, Main Auditorium

HERA – F. Willeke (DESY).

POL2000 – R. Fabbri (NIKHEF).

ZEUS – S. Chekanov (ANL).

HERA-B – M. Mevius (DESY).

HERMES – D. Hasch (INFN Frascati).

H1 – C. Diaconu (Marseille).

AMANDA,Baikal,IceCube – S. Schlenstedt (DESY).

Status Reports LC R&D:

Forward Calorimetry – W. Lohmann (DESY).

TPC – R.D. Settles (MPI-München).

Closed sessions: October 28-29th 2004

Item 1. Review of HERA.

Item 2. Review of POL2000.

Item 3. Approval of minutes and matters arising from the last meeting.

Item 4. News from the Laboratory.

Item 5. Review of AMANDA,Baikal,IceCube.

Item 6. Review of TPC.

Item 7. Review of Forward Calorimetry.

Item 8. Review of ZEUS.

Item 9. Review of HERMES.

Item 10. Review of HERA-B.

Item 11. Review of H1.

Item 12. AOB.

Item 1. Review of HERA.

There was no presentation from the machine in the closed session.

The reliability of the machine was discussed in detail. The largest cause of down time in the last running period was various vacuum failures. With the upgrades in the north region, improved monitoring, and improved understanding of the causes of the failures, it is expected that there will be much fewer vacuum failures in the future. The next largest cause for failure was the proton RF system. Here additional manpower has been invested which should improve the long term reliability. In addition, significant effort has been invested in improving the machine control software and operator training. With the above improvements it is hoped that the machine will in the next 2-3 months reach an efficiency such that HERA will deliver luminosity for about 60% of the time. With a projected 40mA electron current this will enable HERA to deliver 100 pb^{-1} in the next running period.

The failures of the BU-Magnets were discussed and the implications that additional failures could have on the planning of HERA running. Possible causes for the helicity dependence of the beam polarization were reviewed.

The PRC continued its discussion in closed session.

The PRC acknowledges the tremendous effort of the HERA team which made the 2004 running period a success. HERA delivered the largest integrated luminosity per year so far, in spite of several major difficulties. The PRC also appreciates and strongly supports the HERA reliability improvement program and the installation of a HERA operation crew. It takes note of the failure and the exchange of several BU-magnets coils. Further failures, which most probably will occur, will require flexibility in the shutdown schedule. The PRC acknowledges the success in achieving positron polarization – it encourages a closer collaboration between HERA and all three experiments to further improve the value of the polarization. In order to come close to an integrated luminosity of 1 fb^{-1} will require the full attention and support of the management to the operation of HERA.

Item 2. Review of POL2000.

T. Behnke reviewed the status of the longitudinal polarimeter (LPOL), the transverse polarimeter (TPOL), and the LPOL cavity project. Some new manpower for analysis is available and a new offline analysis subgroup has been formed. Concerning the operation of the polarimeters, there is at present just enough manpower to operate, maintain, and calibrate the polarimeters. The status and plans for the LPOL cavity were presented in detail. J. Mnich presented the review of the POL2000 project. The main cause of the difference in the polarization measured with the two polarimeters has been found and the two polarimeters now agree to within 3%. Much more analysis effort will be needed to reduce the final uncertainty to the originally proposed 1% level. The damage caused by synchrotron radiation to the cavity has been repaired and measures

have been taken to prevent such damage in the future. Commissioning of the cavity project will require significant effort.

The PRC continued its discussion in closed session.

The PRC notes with satisfaction, that the two polarimeters provided reliable data for practically all of the HERA running. The PRC congratulates the POL2000 group for the significant progress in understanding the polarization measurement of the TPOL and in the running-in of the cavity for the new LPOL. It takes note of the progress in designing the new LPOL calorimeter and considers it important that it be completed in early 2005 and installed as soon as possible. The PRC takes note that the manpower of the POL2000 remains critical and encourages all three HERA Collaborations to further strengthen the group. The proposal that individual members of the HERA collaborations become “semiexperts” in polarization and help the HERA crew to increase the polarization level, should be considered.

Item 3. Approval of the minutes and matters arising from the last meeting.

The minutes from the 58th PRC meeting were approved with minor corrections. The following PRC members come to the end of their first term: H. Blümer, J. Brau, W. Hollik, Y.-K. Kim, and J. Kühn. H. Blümer informed the Chairman that he would not be able to continue because of other commitments; the other members agreed to continue. The following PRC members come to the end of their second or third terms: S. Bertolucci, L. Rolandi (Chair). J. Mnich will take a position as “Leading Scientist” at DESY and thus will leave. R. Klanner comes to the end of his term as Director for Research and thus also his membership ends. The Chair and A. Wagner thanked the outgoing members for their important contributions to DESY’s Particle and Astro-Particle Physics program. The PRC proposes to the SC (Scientific Council) as new PRC members: G. Anton (Erlangen), R. Milner (MIT) and P. Buchholz (Siegen).

Item 4. News from the Laboratory.

The results of the laboratory’s review by the Helmholtz Gemeinschaft were summarized. The laboratory received in general excellent ratings and the strategy for the future of DESY was strongly supported. The funding for the laboratory for the next 5 years is now known and concrete planning has begun. Items which received additional funding from the Helmholtz Gemeinschaft include the linear collider and a program to improve the HERA reliability.

EuroFEL was approved and will pay for an eight cavity test stand for the FEL.

The PRC takes note of the report presented by A. Wagner and congratulates DESY in particular for the excellent performance in the HGF evaluation which has confirmed DESY’s strategy and for the recent decision for the super-conducting technology as choice for the International Linear Collider.

Item 5. Review of Baikal, Amanda, and IceCube.

C. Spiering summarized the recent publications from Amanda and IceCube and then reviewed the status of the funding for the experiment. The main goal of the work this season is the testing of the new enhanced hot water drill EHWD. If these tests are positive then the projected installation of 16 to 18 strings per year will be feasible. The manpower situation in the collaboration was reviewed and it was pointed out that though the size of the DESY collaboration was increased other groups in the collaboration have expanded more rapidly. To maintain visibility inside the collaboration additional growth is needed.

R. Wischnowski summarized the status of the Baikal experiment. Due to the delays in the Antares experiment Baikal continues to deliver unique data. The status of the upgrades to the lake Baikal experiment were reviewed. Some small additional funding for repairs was needed and was made available. Additional manpower for analysis of the Baikal data would be greatly helpful.

H. Blümer presented the the review of Baikal, Amanda, and IceCube. He confirmed that the lake Baikal upgrade is progressing well and supports the DESY policy to continue the experiment up to when Antares switches on. He reported that the dome production for IceCube is progressing but should be monitored. It was stressed that the analysis topics for IceCube are now being distributed and therefore an increase in manpower (as recommended by the Helmholtz Gemeinschaft) soon would be very important.

H. Blümer also stressed that in the Helmholtz Gemeinschaft review it was clearly requested that the progress and any potential problems should be reported.

The PRC continued its discussion in closed session.

The PRC is pleased to see the progress in the analysis of the Amanda data and that, with the funding of IceCube now approved, its construction is going ahead. It acknowledges that the personnel situation remains critical, in spite of a recent increase of (in particular senior) personpower.

Item 6. Review of TPC.

There was no presentation from the TPC collaboration in the closed session.

U. Kötz presented the review for himself and R. Forty. In general the collaboration is active in investigating many aspects of TPC design. A large number of studies concerning the performance of TPCs with GEM and Micromegas detectors have been performed. Specifically the problem due to ion backdrift with Micromegas and GEM detectors have been shown to be solvable. In addition a new TPC design based on a pixel detector readout has been demonstrated. The design of the field cage has improved and is now at the level projected in the Tesla TDR. In the next year the small scale design studies should be finished. At present all designs have demonstrated that the Tesla TDR specifications can be met. The next steps should concentrate on studying stability and reliability in a large scale prototype. In addition energy loss studies should

be performed. Efforts should focus on understanding the detectors sufficiently well to define the optimum parameters and select the best design. A stronger organization is needed to coordinate combined efforts needed for a large scale prototype.

The PRC continued its discussion in closed session.

The PRC acknowledges the impressive work of the TPC group as an international effort and encourages a further globalization of the LC-TPC effort. The PRC recognizes the importance to finish the studies done in the first phase of the R&D (called demonstration phase in the report) and the progress towards this goal during the last years. It agrees that a next step should be the design and construction of a second generation (larger) series of prototypes. The PRC supports the group in its continuing need for test facilities, e.g. the high field magnet at DESY and elsewhere and adequate test beams of electrons and hadrons, which will be required in particular starting around 2006. The PRC recommends that DESY continues to strongly support the group in order to allow an involvement in the project at a significant level.

Item 7. Review of Forward Calorimetry.

The forward calorimetry group gave no presentation in the closed session.

J. Brau presented the reviewer's report for himself and J. Gayler. The forward calorimetry group is working on the design of the ILC calorimeters needed to measure the luminosity and beam parameters. The precision of the luminosity measurements required for the ILC experiments is 2×10^{-4} which requires improvements in both calorimeter design and theoretical understanding. The collaboration has reviewed the design of the luminosity calorimeter and studied the layering and segmentation in detail. Mechanical studies have indicated that the support for the tungsten radiator must be mechanically independent of the active detector support. Studies with crystal calorimeters, wire chambers, diamond detectors, and silicon detectors are being performed. At present there is some focus on diamond detectors studies as it is felt that this technology would require the longest R&D phase. The collaboration acknowledges that low resistivity silicon detectors are a viable alternative. The collaboration is aware that the design of the forward calorimetry depends strongly on the final IP design which is not yet fixed. The collaboration was complimented for their pioneering studies.

The PRC continued its discussion in closed session.

The PRC takes note of the significant progress achieved. The time scale of 2 to 3 years for the proposed research appears reasonable and the collaboration is encouraged to remain focused on the milestones as proposed. The PRC remarked that the design of the Forward Region will strongly depend on the layout of the IR (Interaction Region) which still has to be finalized for the ILC. The PRC noted that achieving a luminosity precision of 2×10^{-4} is exceedingly challenging; it strongly encourages a detailed Monte

Carlo study which also takes into account higher order effects. This may result in a rethinking of the measurement strategy compared to LEP. In addition theoretical progress for the calculation of higher order effects is required. The PRC acknowledges that the group has access to the world expertise in this field.

Item 8. ZEUS.

R. Yoshida presented the status of ZEUS in the closed session. The number of publications and selected physics results were shown. The status of the present physics run was summarized. The data taking efficiency of the ZEUS experiment in May-June was up from 65% to 85% thanks to the improvements in coasting beam and improved DAQ stability. The reasons for deciding not to modify the vacuum system around ZEUS were presented in detail. The only serious problem with the ZEUS detector was with the straw tube tracker STT sub-detector. Due to cooling problems this detector cannot be operated. The collaboration presented a detailed analysis of the detector status and is now working on plans to repair the detector.

B. Spaan presented the referee report for himself and Y.K. Kim. The PRC reviewers were pleased with the publications and the status of data analysis. The data taking efficiency is improved and now both luminosity monitors are working. The manpower status of the experiment is stable. The reviewers support the collaborations plan to repair the STT.

The PRC continued its discussion in closed session.

The PRC is pleased with the physics results (in particular also from the 2004 run) presented and with the significant improvement of the running efficiency during 2004. The PRC takes note that due a cooling problem, the STT (Straw Tube Tracker) will have to remain off. It supports the collaboration in its effort to design the necessary hardware for the repair with highest priority and be ready at the next longer interruption of HERA running.

Item 9. Review of HERMES.

E.C. Aschenauer presented the status of the HERMES experiment. The recent publications and conference proceedings were reviewed. The detector was operating without problems and the machine was delivering luminosity with the same efficiency as in 1997. The main concern of the collaboration is the low value and the helicity dependence of the polarization. The status of the recoil detector project was reviewed and it is expected that it will start taking cosmic ray data for tests in February and be ready for final installation in June.

N. Saito presented the review of the HERMES experiment. The reviewers were pleased with the status of the data analysis and the performance of the detector. As the recoil

detector is planned for installation and operation in the last 2 years of the HERA running the reviewers expressed the opinion that it is critical that the hardware and software be tested as thoroughly as possible before installation.

The committee continued its discussion in closed session.

The PRC is pleased with the physics results presented and the efficient running in 2004. The PRC acknowledges the progress of the Recoil Detector construction. It takes note that the complete detector will undergo a test run in January 2005 and be ready for installation in HERMES from February 2005 onwards. The PRC asks the collaboration to present a summary of the various test and calibration measurements at the next meeting and to demonstrate the readiness of the software by a test of the full analysis chain using simulated data.

Item 10. HERA-B

The collaboration briefly reviewed its manpower situation and analysis status. R. Forty presented the review of the experiment. The detector is partially dismantled and will remain in its present state until the end of HERA running. The collaboration has reviewed their analysis topics and available manpower. Priority is placed on the analyses which were the basis of the original approval. The collaboration expects to continue with analysis until the end of 2005 and requests support from DESY until then.

The committee continued its discussion in closed session.

The PRC is pleased with the physics results presented and takes note that the collaboration has published two physics papers in 2004 and that three more are well advanced. The PRC takes note that the data reconstruction is in a final shape but that the simulation needs further improvements. The collaboration is strongly encouraged to complete the physics analysis of all the topics for which they have been approved, even if this extends beyond 2005. An effort should be made to request in time sufficient support for this activity.

Item 11. H1

M. Klein summarized the status of the experiment.

T. Lohse presented the review for himself and J. Mnich. The collaboration has an impressive physics output and is maintaining the size of their membership. The amount of data collected in 2004 exceeds the 2000 data set. The previous detector upgrades were reviewed. The hardware for the Fast Track Trigger (FTT) is functional and now tuning of the algorithms and offline studies can be performed. The system should be fully functional in Spring. Commissioning of the VFPS is delayed due to radiation damage of the control optical links. The fibers have been re-routed and commissioning can restart.

Two of the H1 detectors the Forward/Backward silicon trackers (FST/BST) have been damaged by a water leak and radiation respectively. These detectors play an important

role in the H1 physics program and the reviewers strongly recommend that they be repaired. The collaboration has a detailed plan for the repair and expects the repairs could be finished by September 2005. The repairs include a complete rebuild of the FST, porting the APC/Decoder chips to radiation hard DSM technology, and replacing all APC/Decoder chips on the FST and BST. Unused radiation soft chips are available and can be used if difficulties occur in the manufacture of the radiation hard version. The time scale for the repair is very tight with only one month contingency in the present plan.

The committee continued its discussion in closed session.

The PRC is pleased with the physics results (in particular also from the 2004 run) presented and the good running efficiency in 2004. It gives the analysis of the charmed pentaquarks (CPQ) a very high priority and encourages the collaboration to present an analysis as similar as possible to the one where first evidence for a CPQ has been reported. The PRC takes note that CIP (Central Inner Proportional Chamber) and CST (Central Silicon Tracker) are now functioning well, and that the FTT (Fast Track Trigger), with some delay, is now almost operational. It also notices the slow progress in getting the FPS (Forward Proton Spectrometer) and the new VFPS (Very Forward Proton Spectrometer) operating. Concerning the damage of FST (Forward Silicon Tracker) and BST (Backward Silicon Tracker) the PRC comments, that - FST and BST repair, if completed by autumn 2005, is fully justified for physics reasons, - given the ambitious luminosity goal of HERA, the little time left to achieve it and the risk of a longer shutdown required for repairs (e.g. BU-coils) at an early unforeseen time, the maximum flexibility in the shut-down schedules is important; the schedule should not be dictated by the BST/FST repair, – an effort should be made that at least one of the detectors be ready for installation as early as possible and the use of the available non-radiation hard chips should be considered.

Item 12. AOB

The dates for the PRC meetings in 2005 are May 26th - 27th for the 59th PRC session and November 10th - 11th for the 60th PRC session.

The current list of PRC referees is:

H1 - T. Lohse, J. Mnich

HERA-B - R. Forty

HERMES - S. Bertolucci, N. Saito

ZEUS - Y.K. Kim and B. Spaan

Polarization 2000 - J. Mnich

Baikal, Amanda, and IceCube - H. Blümer and L. Rolandi

R&D LC - J. Brau, J. Timmermans

Theory - W. Hollik, J. Kühn

Invited Reviewers:

TPC - U. Koetz

Forward Calorimetry - J. Gayler

(J. Stewart - September 18, 2005)