

Minutes of the 57th Meeting of the PRC

DESY May 27th and 28th 2004

PRC members present:

S. Bertolucci (INFN-Frascati), H. Blümer (FZK), J. Brau (Oregon), U. Gensch (DESY), W. Hollik (MPI-Munich), Y.K. Kim (Chicago), R. Klanner (DESY), J. Kühn (Karsruhe), 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), M. Bieler (DESY).

Pol2000 M. Beckingham (DESY), S. Schmitt (Zurich).

Representatives from the Experiments:

H1 M. Klein (DESY), P. Newman (Birmingham),
D. Pitzl (DESY), V. Chekelyan (MPI-Munich).

ZEUS R. Yoshida (ANL), R. Carlin (Padova), E. Gallo (INFN Firenze),
R. Hall-Wilton (U.C. London).

HERA-B M. Medinnis (DESY), J. Spengler (MPI-Heidelberg),
M. Villa (INFN Bologna), A. Zoccoli (Bologna).

HERMES E. Aschenauer (DESY), M. Amarian (DESY), P. Di Nezza (Frascati),
B. Zihlmann (Gent).

R&D for TESLA Detectors:

R.D. Heuer (DESY), F. Sefkow (DESY).

CALICE J.C. Brient (Ecole Polytechnique), A. WHITE (Texas Arlington),
P. Dauncey (I. C. London), D. Bowerman (I. C. London),
J.C. Vanel (Ringuet), V. Zutshi (North Illinois Univ.)
G. Blazey (North Illinois Univ.), J. Cvach (Prague),
M. Danilov (ITEP, Moscow).

External Reviewer:

D. Pitzl (DESY) for CALICE.

The PRC received the following documents:

Update Reports from Existing R&D projects:

PRC R&D 01/02 Update 01(04)

Agenda:

Open session. May 27th 2004, Main Auditorium

HERA – M. Bieler (DESY).

POL2000 – M. Beckingham (DESY).

H1 – P. Newman (Birmingham).

HERMES – B. Zihlmann (Gent).

HERA-B – M. Villa (INFN Bologna).

ZEUS – R. Hall-Wilton (U.C. London)).

Status Reports LC R&D:

CALICE – A. White (Texas Arlington).

Closed sessions: May 27-28th 2004

Item 1. Approval of minutes and matters arising from the last meeting.

Item 2. News from the Laboratory.

Item 3. Review of HERMES.

Item 4. Review of CALICE.

Item 5. Review of HERA.

Item 6. Review of H1.

Item 7. Review of POL2000.

Item 8. Review of HERA-B.

Item 9. Review of ZEUS.

Item 10. Review Decision to Switch to Electrons.

Item 11. AOB.

Item 1. Approval of the minutes and matters arising from the last meeting.

The minutes of the 56th session were accepted with minor changes. The new members T. Lohse, N. Saito, and J. Timmermans were welcomed to the PRC. The PRC was informed that though the directorate in general agreed with the PRC recommendations concerning the HERA-g experiment they decided not to ask that a new proposal should be submitted.

Item 2. News from the Laboratory.

The status of the next linear collider was reviewed. The next major milestone is the technology decision for the RF technology which should be taken in Fall 2004.

Organizational issues for the linear collider project were discussed. The results of the review of the DESY laboratory by the Helmholtz Gemeinschaft were presented. All aspects of the DESY physics program were reviewed including experimental and theoretical particle physics, astroparticle physics, and the synchrotron radiation program. The review was very positive but how the individual ratings will affect funding is not clear. The plan for an intermediate HEP program in the time between the end of HERA and the start of the linear collider was supported, but no additional funding was granted.

Since the last PRC meeting the performance of HERA has greatly improved and the experiments are now taking production data. As stable running has been achieved the issue of the most favorable time to switch to electrons was raised with the machine and the experiments. The collaborations were unable to reach a consensus on the optimum running plan for HERA. Therefore the DESY directorate took the decision to switch to electrons near the scheduled shutdown in summer 2004. As both electrons and positrons are needed for the HeraII physics program changing to electrons soon is important to have a basis for planning. This decision agrees with the previous recommendation of the PRC to switch when stable running is achieved. The directorate asked the PRC to comment if in its view the directorate has overlooked an essential point when taking this decision.

Item 3. Review of HERMES.

E. Aschenauer presented physics results released since the last PRC meeting. Data taking experience in recent months was reviewed. The data collecting efficiency is high and 2.8 million DIS events have been collected. However the delivered luminosity is still 40% less than in 1997 and the polarization remains low. Therefore additional time is needed to complete the transverse polarization program. The run plan for the HERMES experiment was discussed. The decision by the directorate to switch to electrons is optimal for HERMES as the transverse spin program can then be completed and sufficient statistics can be collected with the recoil detector with both beam charges. S. Bertolucci presented the review of the experiment and the recoil detector upgrade project.

The PRC continued its discussion in closed session.

The PRC congratulates the Collaboration for the results presented and for the numerous publications and contributions to conferences. The PRC takes note that HERMES is running with more than 95% efficiency but that data taking beyond summer 2004 will be required to accumulate the six millions DIS events with the transversely polarized proton target. The PRC takes note of the decision by HERMES to move the Recoil Detector installation to summer 2005; this allows for a very realistic commissioning scenario. The PRC expects for the next meeting a detailed plan for commissioning, calibration, and alignment of the Recoil Detector as well as for the on-line and off-line software.

The PRC takes note that the Collaboration considers the switch to electrons in summer 2004, and a switch back to positrons by summer 2006 optimal for the HERMES physics program.

Item 4. Review of CALICE.

Presentations were given for the status of the electromagnetic calorimeter (ECAL) and the different designs of the hadron calorimeter (HCAL): Scintillating tiles, RPCs, and GEM. The ECAL prototype should be ready for cosmic tests in Fall 2004 and combined testbeams in 2005. The silicon detectors manufactured in Moscow and Prague have sufficient quality. Three versions of the very front end VFE readout chip have been designed. The signal to noise measured for the version 2 chips for muons is marginal but this should improve for the version 3 chips which will be used for the prototype. Full detector assemblies are now being produced and the DAQ system is being prepared. For the scintillating tile calorimeter (Tile-HCAL) silicon photomultipliers have been selected for the light detection. A front end readout chip is being designed at Orsay and will be tested in Fall 2004. Technical studies using a miniature calorimeter in the DESY test beam are progressing. RPC based readout is being studied by two groups. Both groups have made extensive studies and now agree on basic design parameters. Prototype two layer GEM chambers have been constructed. Production techniques for large area GEMs are being developed. The CALICE collaboration plans for combined test beam studies with both the ECAL and the HCAL with the 3 different detectors starting in 2005.

The PRC continued its discussion in closed session.

The PRC congratulates the Collaboration for the very good progress achieved in hardware and in reconstruction software. The ECAL prototype will be ready by the end of 2004. The PRC acknowledges that the collaboration has good momentum and should continue the program with the presented schedule and test beams: assuming a start of Linear Collider construction in 2009, it is important and timely to schedule tests with electrons beams in 2004 and with hadrons in 2005. The PRC looks forward to a detailed program for these tests. The PRC observes that there is some duplication of efforts on the RPC for the Hadron Calorimeter and encourages the groups to collaborate closely and to share responsibilities in equipping the one cubic meter prototype. The PRC takes note of the extension of the program towards the study of a tail catcher and a muon system.

The PRC asks the Collaboration to present a status report in autumn 2005.

Item 5. Review of HERA.

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

It was pointed out that the average polarization at present is low, and it was asked what can be expected in the future. F. Willeke replied that the polarization is very sensitive

to small changes in the machine. Until present the machine group has concentrated on background issues and optimizing luminosity. The experience available indicate that when the parameters of the machine are stable the polarization can be tuned well. The general performance of the machine was then discussed. The peak positron current has increased since the start of the year from 25 mA to 50 mA. It is expected that with time the average delivered electron current will still increase by 20 to 40%. The overall reliability of the machine was 40% compared to 60% in the past, indicating that an additional gain in delivered luminosity of 1.5 could be possible.

Comments from the machine concerning switching to electrons were requested. F. Willeke stated that he is confident that HERA will be able to run with electrons, but it is not possible to make a firm projection on how long the commissioning will take. The PRC was reminded that the previous electron run was stopped while the machine was only at 70% of its peak luminosity. Therefore HERA has never been fully commissioned with electrons.

The PRC continued its discussion in closed session.

The PRC congratulates the HERA team for the success in the operation of the machine and for starting to deliver important integrated luminosity to the experiments with polarized positron beams. The PRC acknowledges the enormous effort invested for bringing HERA to the present level. The improvement in the luminosity is a complex problem that requires increasing the reliability of the machine. The PRC takes note that the present level of polarization and the specific luminosity is somewhat smaller than foreseen.

Item 6. Review of H1.

The review started with the report from the reviewers. At the time of the review HERA had delivered 60 pb^{-1} with acceptable background levels. The experiment has suffered from bursts in background causing detector trips but this problem seems to have been recently solved. The H1 detector upgrades are working. They are now taking data with the Very Forward Proton Spectrometer (VFPS). The Fast Track Trigger (FTT) is now being commissioned. However shortly before this meeting half of the Forward Silicon Tracker (FST) ceased functioning. The collaboration will seek to repair the detector as soon as possible but this could require a longer shutdown.

The collaboration then presented their requests for HERA running. The H1 collaboration is of the opinion that it is important to collect a large data set quickly. They are convinced that the total integrated luminosity at the end of HERA running will be larger if the machine waits until 2005 to switch to electrons. Therefore H1 does not wish to switch to electrons in Autumn 2004.

The PRC continued its discussion in closed session.

The PRC congratulates the Collaboration for the progress in running, for the results presented - including first physics results from HeraII data - and

for the numerous publications and contributions to conferences. The PRC takes note that the VFPS (Very Forward Proton Spectrometer) is starting to take data, and that the FTT (Fast Track Trigger) has produced first results. The PRC takes note that 50% of the FST (Forward Silicon Tracker) is not operational because of radiation damage, and that the collaboration is looking into the planning of its repair, which could cause an increase in the length of the summer shutdown. The PRC takes note that the Collaboration wishes to at least double the accumulated luminosity with respect to Run I (i.e. 100 - 200/pb) during 2004 and therefore strongly prefers to continue with positrons after the summer 2004 shutdown.

Item 7. Review of POL2000.

S. Schmitt presented the status of polarimetry at HERA. The longitudinal and transverse polarimeters continue to show a discrepancy of 5 to 15 percent. The LPOL systematic studies were complete and the estimated systematic error on the LPOL is 2%. The TPOL offline analysis is progressing. A dependence between the focusing of the positron beam at the TPOL and the measured polarization is observed and under study. There are delays in commissioning the new laser cavity for the LPOL due to radiation damage of the electronics. Improved shielding is foreseen. The H1 collaboration has agreed to construct a new calorimeter for the LPOL which is sufficiently radiation hard to be used with the new laser cavity.

J. Mnich gave the review of the POL2000 project. Significant progress in understanding the difference in polarization measured by the two polarimeters has been made but more analysis work is needed. The cavity project has been delayed by 6 months due to the radiation damage problem. A large effort is needed to commission the LPOL with the new laser cavity. Manpower remains an issue.

The PRC continued its discussion in closed session.

The PRC congratulates the polarization team for the results shown on the polarization measurement. The PRC takes note that the new calorimeter for LPOL will be constructed by members of the H1 Collaboration before the end of 2004. The PRC takes note that the laser controller of the Cavity LPOL has been damaged by radiation and that new shielding has been designed and will be installed during the next shutdown. The PRC re-iterates the importance of a fast commissioning of the new LPOL also needed for a faster optimization of the polarization.

Item 8. HERA-B.

M. Medinnis briefly reviewed the analysis efforts and manpower situation of HERA-B. Preliminary results for production of B, J/Ψ , χ_c , open charm, K^*/ϕ , and hyperons are available. These analyses should be published by the end of 2004. Analysis activities should be finished by the end of 2005. 10 of the 20 remaining students are expected to

graduate this year. HERA-B is benefiting greatly from the continued support from DESY for Eastern visitors.

L. Rolandi presented the review for R. Forty. The plans for moving HERA-B away from the beam have been made. The manpower is reducing slightly slower than projected. The collaboration is carefully monitoring the manpower situation and may need to redistribute personnel to finish some analyses. The collaboration is proceeding in an orderly fashion to complete their physics program.

The PRC continued its discussion in closed session.

The PRC congratulates the Collaboration for the results presented and for their continuing analysis effort. The PRC takes note of the significant progress in data analysis and of the wish of the Collaboration to finalize the analysis and publish the major topics by end of 2004. Analysis activities will have finished by end 2005. The PRC re-iterates the importance of completing the study of the A-dependence of J/Ψ production.

Item 9. Review of ZEUS.

R. Yoshida reviewed the status of the ZEUS collaboration. The base background level is now acceptable but spikes in the background have caused problems. With the recent fix of an RF generator in HERA the problem seems to be solved. ZEUS is now running with high efficiency. The Micro Vertex Detector (MVD), Straw Tube Tracker (STT), and the luminosity monitor's 6 meter tagger are now in operation. The recent results and publications from ZEUS were summarized.

The reasoning why ZEUS strongly supports the directorate decision to switch to electrons was then reviewed. ZEUS emphasized that both electron and positron running are necessary for the HeraII physics program. Should unforeseen difficulties with electrons be found an early switch would give sufficient time to seek solutions. The collaboration also is of the opinion that the electron data will more rapidly yield high impact results. ZEUS then explained why they will not submit a proposal for low energy running.

The reviewers then reported on the ZEUS experiment. ZEUS is now approaching the data taking efficiency achieved in HeraI. A luminosity measurement with roughly 2% uncertainty should be possible by this summer. The MVD is now working well with high efficiency and a resolution of 50 μm . The reviewers expressed concern due to the reduced size of the collaboration.

The committee continued its discussion in closed session.

The PRC congratulates the Collaboration for the progress in running, for the results presented - including first physics results from HeraII data - and for the numerous publications and contributions to conferences. The PRC takes note that the 6-meter tagger has been reinstalled and that the luminosity measurement has achieved a 2% precision in spite of the radiation

damage of the pair spectrometer. The PRC takes note that the MVD (Micro Vertex Detector) is working very well in spite of the accumulated radiation and of a major proton beam accident. The PRC takes note that the STT (Straw Tube Tracker) has been stable since December with only 3 out of 48 sectors out. The PRC expresses concern that the size of the Collaboration is reduced by 30%. The PRC takes note that the Collaboration strongly favors the directorate's decision to switch to electrons in summer 2004.

Item 10. Discussion on Switching to Electrons.

The PRC met in a closed session to review the decision on when to switch to electrons in Autumn 2004. After reaching a consensus the PRC summarized its conclusions to the experiments and the machine.

The PRC takes note of the decision of the DESY Directorate to the switching to e- at or shortly after the summer 2004 shutdown and of their request to discuss the issue a posteriori in the PRC. The PRC understands that the discussion is not academic and that the Directorate will value highly the comments made by the PRC. The PRC acknowledges the very important progress done on HeraII since the last PRC meeting and the steady improvement on luminosity. The PRC notices that there is still a relevant factor to gain mainly on reliability and that the possibility to collect a relevant fraction (200/pb/year for 3 years) of the initially foreseen luminosity is still in reach . The PRC is of the opinion that there is no need to open today a discussion on a possible change of the main physics goals of the HeraII program: the main run strategy (approximately evenly distributed integrated luminosity in e+ and e- with the two polarizations) is still valid today requiring a switching to electrons. The PRC is confident that the management will resolve this issue of the schedule. The PRC acknowledges the fact that there is no contingency in the integrated luminosity foreseeable for a successful HeraII program in the given time window. The PRC notices that the running of HeraII is still improving with time in a relevant way, implying that the process is still in a learning phase: the integrated luminosity is maximized switching to a new situation (electrons) when the machine has reached reliable running conditions.

Item 11. AOB

It is proposed to move the review of LC Cal to Autumn 2005 in order to review both CALICE and LCCAL simultaneously.

The next meetings of the PRC will be on October 28th and October 29th.

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

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

W. Hollik, J. Kühn - Theory

Invited Reviewers:

CALICE - D. Pitzl

(J. Stewart - October 31, 2004)