DRAFT – Minutes of the 53rd Meeting of the PRC

DESY 16-17th May 2002

PRC members present:

J.Arvieux (IPN-Orsay), M.Albrow (FNAL), J.-J.Aubert (Marseille), S.Bertolucci (INFN-Frascati), A.Buras (TU Munich), R.Forty (CERN), U.Gensch (DESY-Zeuthen), E.Hughes (Caltech), K.Jakobs (Mainz), R.Klanner (DESY), J.Mnich (Aachen), E.Reya (Dortmund), L.Rolandi (CERN,chairman), D.Trines (DESY), B.Spaan (TU Dresden), A.Wagner (DESY), K.Borras (DESY,secretary), U.Schneekloth (DESY,HERA experiment coordinator).

Non PRC members attending closed session items:

HERA	M.Bieler (DESY), E. Gianfelice-Wendt (DESY), F.Willeke (DESY).
H1	E.Elsen (DESY), M. Klein (DESY), D.Pitzl (DESY), P. Schleper (DESY).
ZEUS	B.Foster (Bristol), M.Kuze (KEK), W.Zeuner (DESY), K. Long (London).
HERA-B	M.Medinnis (DESY), B.Schmidt(DESY), A.Zoccoli (Bologna), J. Spengler (MPI Heidelberg).
HERMES	D.Ryckbosch(Gent), E.Aschenauer (DESY), J.Stewart (DESY), U.Stösslein (Colorado), M.Bouwhuis (Illinois), R.Kaiser (Glasgow), B.Seitz (Giessen).
R&D for TESLA Detectors	R.-D.Heuer (DESY), T. Behnke (DESY).
AMANDA & IceCube	C.Spiering (DESY).
POL2000	T.Behnke (DESY), K. Long (London), V. Gharibyan (DESY), D. Barber (DESY).

The PRC received the following documents:

PRC 02/01 The HERMES Recoil Detector – Technical Design Report. (The HERMES Collaboration)

Agenda:

Open session. May 16th 2002, Main Auditorium

H1 – P.Schleper (DESY).

ZEUS – K.Long (IC London).

HERMES – D.Rykbosch (University of Gent).

HERA-B – A.Zoccoli (INFN Bologna).

HERA – D.Trines (DESY).

POL 2000 – V. Gharibyan (DESY).

Closed sessions: May 16-17th 2002

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

Item 2. News from the Lab.

Item 3. Review of HERA.

Item 4. Review of POL2000.

Item 5. Review of H1.

Item 6. Review of HERA-B.

Item 7. Review of AMANDA and IceCube.

Item 8. Review of R&D for TESLA Detectors.

Item 9. Review of ZEUS.

Item 10. Discussion on ep Physics.

Item 11. Review of HERMES.

Item 12. Miscellaneous.

Item 1. Approval of the minutes and matters arising.

The chairman opened the 53rd session by welcoming all PRC members, especially J.Mnich as a new member. R.Cashmore was unable to attend the meeting.

The minutes of the 52nd PRC were accepted subject to minor changes.

Item 2. News from the Lab.

A.Wagner reported on the developments for the transformation of PETRA into a dedicated synchrotron light source. A study group was established to answer the question from the Scientific Council if the ability of PETRA to serve as an injector for HERA could be preserved. No clear solution was found for both functions at the same time while guaranteeing stable operation of PETRA as a synchrotron light source. After discussions with the experiments the decision was taken to end HERA by the end of 2006. The transformation of PETRA is planned for beginning of 2007.
Several groups are studying possible physics topics for HERA III until end of 2003. By then it should be known if TESLA is approved. It might be possible to build a booster to enable future running of HERA, but this has the boundary condition of not disturbing stable running of PETRA.

Several news items concerning the linear collider project were presented. The first 9-cell-cavity has been produced which reaches the design goal. This confirms the possibility of applying single cell production technologies to complete modules of 35MV/m required for 800 GeV energy.

Experts from KEK and laboratories in the US investigated the status of technology and costs and did not find any open issue. They agreed to the systematics of costs and would expect a more expensive production in Japan or US due to more expensive manpower. The Tesla Test Facility has been run for more than 4000h and the machine proved to work reliably. The UK has joined and Spain will join the programme.

The ensuing discussion focused on the future PETRA and HERA running. It was concluded by the chairman that the PRC does not deal with items for the synchrotron light community and that the decision taken of the Directorate was taken in a general optimization for the laboratory; the possibility to conclude the HERAII program before 2007 was an important assumption in taking this decision.

Item 3. Review of HERA.

F. Willeke started the review by confirming that the most important points have been mentioned in the open session. The question about physicists from the experiments being involved in the work of the machine group was answered by a detailed description of the established task force. This task force meets at least once per week for regular discussions of the results from special runs and plans for the further running. Usually the nights are used for high intensity running for HERMES or HERA-B and improvement of the vacuum. During the days special runs are performed for the study of several issues. One of these is the high background, which cannot be compensated by reducing the energy of the positrons for which the source has to be identified. Other issues to be worked on are small movements of the bridges and the development of a compensation procedure for closing and opening of the ZEUS calorimeter. These are operational issues but no principal issues. The separate rings have been understood, but the handling of high intensity beams is difficult. For example beam beam interactions have to be studied in detail. Missing manpower is a serious issue. But new people, even experienced ones from outside if they were available, have to be trained for a considerable amount of time and cannot be of immediate help.

The PRC takes note of the difficulties and delays which have occurred in the start-up of HERA II and the problems with the background in the H1 and Zeus interaction regions. So far no show-stopper has been found but the success of the upgrade has not yet been demonstrated. The PRC welcomes the actions taken by the management to reinforce the HERA team by dedicated task-force groups and by additional manpower. The PRC expresses its confidence that the measures taken by the management and the machine group are appropriate to tackle the problems.

Item 4. Review of POL 2000.

T.Behnke opened the review with a brief status report. For the Transverse Polarimeter (TPOL) the hardware upgrade is essentially finished. The current activities concentrate on analysis work and operating the new system, which is in routine data taking since

March. The main display window of the new DAQ interface runs platform independent in all control rooms of HERA and the experiments. To achieve the goal of 1% total error a new analysis technique was developed and checked with Monte Carlo simulations and is ready to be used in the data analyses. The re-analysis of the 2000 data is envisaged. The offline analysis method is being tested.
In the Longitudinal Polarimeter (LPOL) the new calorimeter gives a much improved linearity and a more stable configuration than the previous crystal calorimeter. LPOL is ready to take data. A test module for the LPOL cavity upgrade operates routinely in Orsay. Presently the main problem is given by the overall power in the cavity being 4 to 5 times lower than expected. The arrival of the final cavity in Orsay is planned for June 2002 followed by equipping and commissioning in July/August 2002. The estimated time for installation at HERA is 2 to 3 weeks.
Some changes in manpower for important subcomponents are already happening and others are expected in summer 2002 due to ending contracts.
T.Behnke concluded that TPOL and LPOL are ready for data taking at HERA II. The group is confident to meet the goals for the TPOL upgrade and envisage the installation of the LPOL upgrade for end of the year 2002. As a prototype of a HERA wide working group POL2000 worked fine and still does rather well.

In his report the referee J.Arvieux confirmed the readiness of TPOL and LPOL for data taking. Good progress has been made in terms of precision, presently being 1.6% the envisaged 1% seems to be achievable. The new cavity is delayed by 2 to 3 months. The difficulty of finding a factory capable of manufacturing the cavity within the estimated cost will delay delivery by 2-3 months.

In the further discussion the one minute time scale for LPOL was questioned. Since the polarization changes on the time scales of 0.5h, it is not a critical issue of 1 or 5 minutes. Going for example to 3 minutes would make the analysis a bit easier.
The similar device at CEBAF was mentioned and T.Behnke reported that there have been problems in getting it run and understood, but now it is running stable and the results are used by the experiments.
Reasons for the missing power in the test cavity could be dirt on the mirror or due to the laser pumping only a fraction of the power into the cavity. The mirror could be rebuilt and the laser replaced. With the present status 2% precision is possible. The discussion was concluded by suggesting that the manpower problem should be discussed with the Directorate and the steering group of POL2000.

The PRC continued its discussion in closed session.

The PRC congratulates the polarisation team for the nice results shown, for the progress in the DAQ and in the understanding of the systematic errors on TPOL. It is pleased that both TPOL and LPOL are ready for polarisation measurements. It takes note of the delay which have occurred with the cavity planned as upgrade of the LPOL. The PRC encourages the group to continue with the same momentum.

Item 5. Review of H1.

The chairman congratulated the speaker of the open session on his nice talk and the collaboration on the new results.

The review was started by the report of the referees by M.Albrow who gave an overview about the status of the experiment. Most components are in good shape and need luminosity with clean beams. Some concern were expressed for the FTD (Forward Tracker Device) which has 28% missing channels in the hardware and missing items in the software. Also the Jet Trigger needs more attention, but the referees are confident that this will be finished. The Inner Proportional Chamber (CIP), which was installed in 2001 has serious front end electronics problems. The repair will be a delicate and time consuming task and requires a shut down of approximately 10 weeks. All possible preparations should be done in advance since the time schedule is tight.
In the area of the upgrade project FTT (Fast Track Trigger) the time schedule for the delivery of the final electronic boards FEM (Front End Module) and MPB (Multi Purpose Board) is tight, in addition software is needed. Commissioning is planned for September/October 2002 in parallel with data taking. The FTT should be operational 1 to 2 months before end of 2002 in case a shut down takes place in early 2003.
All ingredients for the VFPS (Very Forward Proton Spectrometer) seem to be ok. It will need a ca. 10 weeks shut down for installation which could be in January to March 2003.
In summary ep running with clean conditions is vital for commissioning. Polarization would be quite prominent for the 2003 sumer conferences, because it does not need so much data.

The ensuing discussion focused on the need of the CIP. Hard physics could be done with the Liquid Argon calorimeter, but the CIP is especially needed for reducing the background from the collimators C5A and C5B.

The committee continued its discussion in closed session.

The PRC acknowledges the physics results presented and the progress in getting H1 ready for data taking. It takes note of the problems with the CIP, which will take a longer shut-down for repair, and the wish of the collaboration to install the VFPS at the beginning of 2003. The PRC looks forward to a close co-ordination of the planning of the shut-down period(s) needed for detector repair and the installation of the new components with the overall planning of the HERA schedule.

Item 6. Review of HERA-B.

The chairman thanked the open session speaker for his clear presentation. M.Medinnis opened the review of HERA-B with some remarks. He outline the difficulties arising from the HERA delay to fulfill the plan as decided in May 2001. Provision of convincing evidences that HERA-B can reach its aims cannot be delayed. They should give the motivation for the year 2003 and for the submission of a possible new proposal. To achieve this goal 50 shifts were estimated to be necessary for target operation. In a table these 50 hours were distributed to the needs for each component. For the detector status the positive conclusion was drawn that many of the open questions from summer 2000 were now answered satisfactorily. But also in this area the evidence of an improved performance needs more data to become quantitative. The status of the FLT (First Level Trigger) was reported. Its commissioning should be completed this month while the SLT (Second Level Trigger) is ready for on-beam tuning.

In the following the prospects for another physics proposal were discussed, including the boundary conditions due to the limited lifetime of some electronic hardware components.

In the referee's report R.Forty discussed the manpower situation, the physics plan and the detector status in detail. The manpower is decreasing as foreseen. It should be sufficient for this year's running, but serious problems are expected for an extension into 2003. Data taking is crucial to prevent further reduction in manpower. The physics plan is unchanged from the last PRC meeting and progress was demonstrated in respect of the J/Ψ suppression and the measurement of $\sigma_{bb}(pA \to b\bar{b})$ cross section relative to the prompt J/Ψ cross section. Precision will be improved with new data.
The status of the detector was discussed for each individual component. The latest estimate of failures in the OTR (Outer Tracker) might be only a factor of four better than in 2000, but would be still sufficient for an 8-months run. In the trigger area concerns for the commissioning of the FLT were expressed, which needs more investigations with new data. In summary good progress has been made in preparing the spectrometer for the 2002 run. The referees reinforced the previous recommendation that test data should be provided by the machine when possible.

The PRC continued its further discussion in closed session.

The PRC acknowledges the finalisation of the first physics publication. The PRC takes note of the good progress made in the preparation of the detector and strongly supports the request for shifts with stable proton beam required for the timely commissioning HERA-B.

Item 7. Review of AMANDA and IceCube.

In the AMANDA section of his status report C.Spiering focused on the status of publications, the south pole season 2001/2002 and the status of the AMANDA II analyses. Presently two drafts passed the internal review and are to be submitted. Furthermore three raw drafts for publications exist. The work in the south pole season 2001/2002 included a full time calibration with laser, the exchange of 60% of amplifiers with new ones having a larger dynamic range, equipment of 40 channels with fibre read out with FADC's and providing the new surface DAQ to 40 Digital Optical Modules. For the data taking in 2002 the detector is in much better shape than in the years before. After online filtering about 1 Gbyte/day are transmitted via satellite. Monitoring shifts are done as previously from the Northern Hemisphere. For the AMANDA II analyses all data are processed and the mass production of background Monte Carlo simulations is in preparation. For reaching the envisaged goals the need of a permanent position for software and

analysis was emphasized.
The main milestones from 2001 were reviewed for IceCube. Financing problems due to considerations of NFS to give foreseen funding to the NUSL laboratory have emerged. These problems might result in a delay of the schedule by approximately one year.

The reported problems were regarded as serious issue, which makes it difficult to go into any mass production. The collaboration will try to cope with this problem by increasing the effort on the AMANDA II analyses.

The committee continued its discussion in closed session.

The PRC expresses its concern on the political problems with the financing of IceCube, and reiterates the large physics potential of IceCube.

Item 8. Linear collider detector R&D review.

T.Behnke briefly reported on the status of the various R&D proposals for the TESLA detector. The question about particle identification was answered by pointing out the dE/dx measurement of the approved TPC R&D proposal and the cluster counting method. There is no strong physics reason for it and presently no effort on a dedicated detector is made.

The PRC decided to have a review of the R&D proposals during the next two meetings, starting with the calorimeter proposals followed by the tracking proposals.

Item 9. Review of ZEUS.

After the chairman thanked the open session speaker for his clear presentation B.Foster opened the review with a status report. The physics paper production continues constantly. The number of countries in the collaboration has increasedwith the inclusion of the University of the Aegean. In addition several further groups have expressed interest in joining the collaboration.
The detector status was summarized by stating that all components are ready, working and waiting for data. The status of the new components LUMI (luminosity system), MVD (Micro Vertex Detector) and STT (Straw Tube Tracker) were reviewed in more detail. For the MVD it was emphasized that the electronics is only radiation tolerant up to 300 kRad. Mostly due to beam losses during positron injection already 20 kRad were accumulated. The lifetime of two years for the STT Ta capacitors, which were mounted with wrong polarity, seems to be confirmed. After reporting the progress in the area of software and computing, B.Foster concentrated on backgrounds which are much worse when compared to the situation in 2000. This is hoped to be solved in close cooperation with HERA.

B.Spaan gave the referee's report restating the successful integration of the new components into the detector. Some open points remain for the LUMI Monitors to be fully operational: noise limits the actual precision to 5-10% compared to the envisaged 1%, the system is not yet fully integrated into the DAQ and no comparisons between both systems are yet available. The problems are identified and being worked on. In the STT 4 out of 48 modules are not working, which fortunately does not lead to acceptance losses. One module might be repairable. The radiation level for the MVD is presently too high. Further commissioning, alignment, MC tuning are vital tasks and cannot be done properly without data. The referees were pleased with the physics output.

In the following the possible repair of the STT was discussed. It may take months and requires removal of the super-conducting beam magnet. For the collection of radiation it was explained that the monitoring Radfets are read out every 10 to 15 minutes and the rate of radiation continues to be 4 to 5 kRad per month.

The committee continued its discussion in closed session.

The PRC acknowledges the physics results presented and congratulates the collaboration for the overall good status of the experiment . Specifically the PRC takes note of the important progress on the software.

Item 10. Discussion on ep Physics.

In this dedicated discussion the PRC heard the different arguments for the future running schedule from the H1 and ZEUS collaboration. However, priority should be given to the machine and the startup.

The PRC discussed the arguments of H1 and ZEUS to share the 1 fb-1 of HERA II luminosity equally between electrons and positrons with both polarisation states and agrees with the conclusions.

Item 11. Review of HERMES.

The chairman thanked the open session speaker for his informative presentation. The review of HERMES concentrated on the proposal of the Recoil Detector (RD). D.Rykbosch focused on the physics made possible by the new detector component. He emphasized the aspect of the Generalized Parton Densities (GPD), which could be studied with Deeply Virtual Compton Scattering (DVCS). The impact of the RD by detecting the recoiled proton is given by the improvement of the exclusivity and the t-resolution. It opens the possibility to cut on M_x and allows extra physics like Λ detection.
J.Stewart gave a report concerning the hardware of the RD in respect of detector design considerations. Details for the silicon detector, the scintillating fibre detector and the gamma detector including the magnet were given. The performance was summarized with the p, θ, Φ acceptance matching the proton spectrum, a good $t-$resolution especially at low t, a Δ suppression better than 90% and a π^+ rejection greater than 10 for $p < 650\text{MeV/c}$.

The HERMES Interim Report from 19th of February 2002 has been updated and presented by J.Arvieux. In respect of the scientific case the experiment will produce pioneering data in a field of rapid theoretical expansion. Good progress has been made and most questions have been answered concerning: schedule, budget, manpower, the magnet, the silicon detector and the scintillating fibre detector. The schedule remains a concern: if the detector is installed at the end of 2004-beginning 2005, the collaboration will have only 2 years to test and exploit the new detector. The physics program is based on 200 days of running, so it is still OK but any delay would be problematic.

This issue was discussed further. Providing the RD is ready by spring 2004 and the RD installation requires ca. 2 months then the detector will take data for at least 1 year excluding the commissioning phase.

The PRC continued the discussion in closed session.

The PRC acknowledges the physics results presented and congratulates the collaboration for the overall good status of the experiment.

The PRC investigated in detail the physics case for the Recoil Detector and its construction and planning. With the addition of this detector HERMES will make very interesting pioneering measurements for the study of the Generalized Parton Distributions. The PRC recommends for approval the construction of the Recoil Detector and asks the HERMES collaboration to maintain the present schedule having the detector ready for installation at the beginning of 2004. The PRC also takes note of the wish of the collaboration to take further data with a longitudinally polarised proton target.

Item 12. Miscellaneous.

The second meeting of the PRC in 2002 was confirmed for the 30-31st October 2002.

The current list of PRC referees is:

H1 - M.Albrow and J.Mnich
HERA-B - K.Jakobs and R.Forty
HERMES - S.Bertolucci and J.Arvieux
ZEUS - E.Hughes and B.Spaan
AMANDA/IceCube - J-J.Aubert and L.Rolandi
Polarization 2000 - J.Arvieux

(K.Borras - October 22, 2002)