Short Minutes of the BVR 39
Meetings of February 20 – 22, 2008

1 Meetings of the Committee

closed meetings: Thursday, February 21, from 9:00 – 12:25
Friday, February 22, from 9:00 – 12:40

present: D. Bryman
P. Cenci
C. Hoffman (chair)
S. Paul
J. M. Pendlebury
R. Rosenfelder (secretary)
L.Tauscher
excused: A. Blondel

local consultant: C. Petitjean
external consultant: A. Ceccucci

ex officio: A. Denner
H. Gäggeler , J. Mesot (on Friday)

2 New Proposal

R-08-01.1: Muon Capture on the Deuteron - The MuSun Experiment (P. Kammel, C. Petitjean, A. Vasilyev *et al.*)

The Committee considers this an important experiment, which is a natural extension of the previous, highly successful MuCap experiment done by a very capable group. The physics motivation is considered to be good although we are not convinced that the application of the muon capture rate in deuterium to fusion processes in the sun and to neutrino-deuteron scattering will be as precise as claimed in the proposal. Additional theoretical evaluation on this point by some external experts will be obtained in the next months. Nevertheless we believe that the measurement of the muon capture rate in deuterium to an accuracy of 1.5 % is certainly worthwhile and should spur new theoretical calculations relating this to other processes.
On the experimental side some technical challenges lie ahead. For example, the required nitrogen purity will be difficult to obtain and monitor. However, we are confident that the experience and competence of the collaboration will overcome this and other obstacles. Due to investments made for the MuCap and MuLan experiments, the request for resources is rather modest and is spread over many institutions.
The Committee approves this experiment and grants some beam time this fall for tests.

3 Progress Reports and Beam Requests

The Committee received 7 Progress Reports of which 4 were presented orally in the afternoon session on Thursday (February 21). In addition, there were overview talks on experiments R-99-05 (MEG), R-00-03 (UCN) and R-05-03 (nEDM).

The Committee thanks all speakers for their presentations which were very helpful and informative.

R-96-04: Search for Time Reversal Violating Effects in the Decay of Free Neutrons (K. Bodek *et al.*)

This experiment had a successful run last year and is not asking for additional beam time. The Committee acknowledges the receipt of their Progress Report, congratulates the collaboration for obtaining good data, and looks forward to the publication of an interesting physics result.

R-98-03: Lamb-Shift in Muonic Hydrogen (F. Kottmann, R. Pohl *et al.*)

The Committee is quite impressed with the technical progress that has been achieved in the last year, in particular with the improvements in the laser system. We continue to believe that it is important to measure the Lamb-Shift in muonic hydrogen, that the physics motivation is good, and that the group is close to getting an unambiguous result. The moisture problem in the laser hut and the optical bench that plagued the run during the last year is unfortunate and we have asked the PSI management to solve this infrastructure problem before the next run of this experiment.
Unfortunately, there are two worthy requests for beam time in πE5 in the last 3 months of 2008: the Lamb-shift experiment and the $\mu e\gamma$-experiment - R-99-05 (see below). After long deliberation it was decided that πE5 beam time in 2008 will be devoted entirely to the $\mu e\gamma$-experiment and that the Lamb-shift experiment will run during the first 10 weeks of beam time in 2009, with a possible extension if necessary and approved by the Committee. We are aware that this schedule may cause some (personal) problems to the R-98-03 team but hope that the PSI management can work to minimize these issues.

R-99-05: Search for $\mu^+ \to e^+\gamma$ (T. Mori, A. Baldini *et al.*)

There was a special review of this experiment on Wednesday morning (February 20). A detailed report of the Technical Review Subcommittee (A. Ceccucci, P. Cenci, C. Hoffman) is in preparation.
The Committee is tremendously impressed by the extraordinary amount of progress made by the collaboration in the last 6 months: all experimental components have been assembled and worked in the beam together. We are also very pleased that the collaboration is working together as an effective team, and that they took a great deal of calibration data. We urge the team to develop a blind data-analysis strategy that would allow the process to be detected if the branching ratio is large enough. Since the Committee wants to see this experiment taking data at the earliest opportunity, it has decided to give *all* the πE5 beam time in 2008 to MEG – not an easy decision in view of the competing beam time request for the Lamb-shift experiment. The next review by the Technical Review Subcommittee will be on February 18, 2009.

R-99-06: Precision Measurement of the μ^+ Lifetime (G_F) with the FAST Detector (J. Kirkby, M. Pohl *et al.*)

The Committee is very pleased with the progress made last year by the group, in particular with the solution of the subtle electronics problems. Also we note that the collaboration was able to operate rather efficiently last year, although we remain skeptical that remote operation is the best way to run the experiment. The good news is that the experiment should be able to acquire sufficient statistics to determine G_F to 1 ppm, although concerns about systematic effects remain. Because these can only be studied reliably by having enough data, the Committee recommends the requested beam time to be allocated.

R-00-03: The PSI Ultra Cold Neutron Source (M. Daum *et al.*)

There was a detailed review of this project on Wednesday afternoon (February 20) with a Technical Report written by the special Subcommittee (D. Bryman, P. Cenci, S. Paul, M. Pendlebury) to follow.

Overall the Committee is quite impressed by the continuing progress of the project which is now in an engineering phase. Unfortunately fiscal considerations caused a substantial delay in this project.

R-03-01: High-Accuracy Measurement of the Spin-Dependent Neutron Scattering Length of the Deuteron (O. Zimmer *et al.*)

This experiment is technically quite challenging employing a novel technique to measure the *nd* incoherent scattering length. Despite heroic efforts, it seems that it will not be possible to achieve the planned accuracy. However, the Committee endorses the beam request for 2008 and hopes that the experiment can match the precision achieved by previous experiments (which used quite different methods). Unless there is a new proposal, its use of the FUNSPIN area will end in 2008.

R-05-01: Precise Measurement of the $\pi^+ \to e^+\nu$ Branching Ratio (D. Pocanic, A. van der Schaaf *et al.*)

The Committee takes note that the apparatus is working well. A significant data set was collected in the last year, which should allow sufficient statistical accuracy to improve the existing world average. However, there are concerns about the systematic errors and backgrounds, in particular from pion decay in flight, which may limit the final accuracy of this experiment. We recognize that this is a difficult measurement even for an experienced team like the PEN collaboration. We fully support their beam time request for 2008.

R-05-03: Measurement of the Neutron Electric Dipole Moment (D. Rebreyend, K. Kirch *et al.*)

There was a half-day Technical Review of this project on Wednesday afternoon (February 20). In general the Committee is quite encouraged by the significant strengthening of the collaboration – not only in size but also in expertise. We are confident that the collaboration is now strong enough to successfully pursue the 3-phase strategy of improving the bounds on the nEDM. We are impressed by the significant progress in magnetometry and coating. A more detailed report of the Technical Review Subcommittee (D. Bryman, P. Cenci, M. Pendlebury) will be prepared.

4 Miscellaneous

Since S. Paul has joined the nEDM collaboration, there is need for additional neutron expertise in both the overall Committee and the nEDM Technical Review Subcommittee.

As experiment R-96-04 has finished its data taking and R-03-01 will soon end, users cannot expect that the FUNSPIN beam line will still be available in 2009.

5 Next Meeting

The next meeting (BV 40) is again planned as a 3-day meeting, tentatively for Wednesday - Friday, February 18 - 20, 2009.

There will be no UCN and MEG reviews this summer.

March 3, 2008 C. Hoffman, R. Rosenfelder