Short Minutes of the BVR 57

Meetings of 3 – 5 February 2026

1 Meetings of the Committee

closed meetings:	Wednesday, February 4, from 09:00 – 12:15 Thursday, February 5, from 08:30 – 12:00
present:	S. Bacca L. Baudis D. Bryman G. Colangelo C. Curceanu B. Filippone (chair) C. Hoffman M. Iodice M. Jentschel P. Kammel M. Ramsey-Musolf P. Riedler (Tuesday and Wednesday) B. Sauer A. Signer (secretary) U. Uwer
beam time coordinator:	St. Ritt
ex officio:	K. Kirch
apologies:	F. Farget P. Riedler (Thursday)

2 New Proposals

For 2026 there were two new proposals, a letter of intent and several test-beam requests. There was an overbooking of 70% for the πE1 and πE5 beamlines.

LoI: Future $\mu \to e\,\gamma$ (P. Cattaneo *et al.*)

The proposed program is for the development of a future $\mu \to e\,\gamma$ experiment at PSI that has a strong scientific basis and naturally fits within the PSI experimental program. However, the scientific and experimental goals are clearly very challenging. The proponents plan to stage the experiment in two phases. In Phase-1 they discuss re-using some of the hardware from MEGII and then replacing this with the new hardware in Phase-2. The committee encourages

the collaboration to consider whether the effort to set up Phase-1 should be regarded as a significantly different experiment with respect to Phase-2, or whether it would be preferable to aim for a staged development, construction, and commissioning of the detector, with Phase-1 serving as a proof-of-concept with a down-scoped physics reach and a smoother transition to Phase-2.

The committee supports this letter of intent and encourages the collaboration to develop a well-defined conceptual design of the apparatus together with a realistic timeline for a future proposal.

R-26-01.1: 2Alpha (S. Kawase *et al.*)

This collaboration proposes an experiment to measure the emission of two alpha particles following muon capture on Mg and Si nuclei. Observation of double-alpha emission may provide a sensitive test of multi-alpha correlations in highly excited nuclear states populated via muon capture. To investigate this possibility, the collaboration proposes to measure alpha-alpha correlations.

The committee appreciated the originality of the proposed experiment. However, it concluded that the current proposal lacks sufficient simulation studies to quantify the achievable precision in distinguishing the different correlation patterns based on the experimental angle and energy acceptance. Ongoing simulations to optimize the setup have not concluded yet. Furthermore, the connection between multi-alpha correlations and the broader framework of alpha clustering in nuclei should be more clearly articulated. The committee therefore recommends no beam time for this year, but encourages the collaboration to resubmit an improved and more detailed proposal for 2027.

R-20-01.2: Monument (D. Zinatulina *et al.*)

The Monument collaboration carried out several ordinary muon capture (OMC) measurements at the πE1 beamline on isotopically enriched targets. The apparatus used was the GIANT setup developed by the muX / MIXE group. A paper describing the ^{76}Se measurement has been prepared and other results are in preparation.

The present proposal involves making new OMC measurements on ^{12}C and ^{13}C. These are motivated by connections to calculations using ab-initio methods and the nuclear shell model. While the proposed measurements are considered to be useful studies of OMC, the committee believes that more detailed explanations are needed to quantify the impact in relation to the theoretical motivations for measurements of the total decay rates and the partial decay rates and to specify how reaching particular levels of precision will be achieved. In addition, a recent chiral effective field theory (EFT) uncertainty has been recognized as an additional uncertainty in the evaluation of the NDBD nuclear matrix element. This additional chiral EFT uncertainty should at be acknowledged when discussing the implications of the OMC measurements for NDBD. The committee also asks the collaboration to consider whether the ^{12}C and ^{13}C measurements have potential to provide useful experimental input on CKM uni-

tarity and CVC tests. The lightest nucleus with a super allowed Fermi transition is ^{10}C. In the unitarity test, a nuclear structure correction is needed, δ_{NS}. While the ^{12}C and ^{13}C OMC measurements would not provide direct input for this δ_{NS} computation, they may provide a test of the theoretical methods used to compute the ^{10}C δ_{NS} correction.

The committee would also like to see an analysis of the sources and sizes of anticipated uncertainties. Due to the oversubsciption of πE1 this year, the committee does not recommend beam time in 2026. However, we do anticipate a subsequent proposal for running in 2027 that addresses some of the concerns discussed above.

Test: TPC-TC (F. Renga *et al.*)

A TPC with micro pattern readout is discussed as a tracking detector to reconstruct converted photons in a future $\mu \to e\,\gamma$ experiment. The proposal is to test the use of light gases and to gain overall experience with the TPC prototype as a first step towards the proof-of-concept of the photon conversion technique. The two weeks beam time in πM1 is recommended under the assumption that the TPC has been commissioned and tested in the laboratory before.

Test: ESTEC (M. Losekamm *et al.*)

Beam time is requested for a test and calibration of ESA's radiation detectors for space flight. The beam request for 2 weeks in πM1 is needed as early as possible due to integration into the flight instruments for launch in 2027.

The committee recommends 2 weeks of beam time in πM1. If these tests cannot be carried out with MUSE installed, the committee recommends that MUSE be removed and then re-installed after this test.

Test: microRwell (M. Poli Lehner *et al.*)

MicroRwell detectors will be used for the inner part of the LHCb muon detector upgrade. The beam-time request of two weeks in πM1 is granted. However, the collaboration needs to check with the PSI responsible if a gas mixture containing 40% CF4 is allowed.

Test: UCN Imager (K. Yoshio *et al.*)

This request is for beam time to test an imaging UCN detector. The authors motivate the request as a measurement of the weak equivalence principle with neutrons.

However, insufficient information concerning the basic principles of this experiment were provided. Therefore, the scientific impact of the program cannot be evaluated and the committee asks that the proposers come back with an elaborated proposal on the science case. The committee thus recommends that beam time be allocated for detector studies only and in consultation with the local scientists.

3 Progress Reports and Beam Requests

R-99.05.2: Search for $\mu^+ \to e^+ \gamma$ (MEG II) (T. Mori, A. Baldini *et al.*)

During 2025 the MEG II data taking was highly successful, having collected the largest annual data sample since the beginning of the experiment. The committee feels that ensuring MEG II reaches the highest possible sensitivity during the 2026 run is a high priority. The expected sensitivity goal of 5.7×10^{-14} running the full year in 2026 is compelling. However, the committee believes that the request of the full beam time should be reduced due to other important requests in πE5. The committee thus recommends that 18 weeks be allocated for MEG II.

The collaboration also aims at increasing the statistics for the X17 data sample, making use of the CW accelerator. The committee supports this request which does not interfere with other activities.

MEG II also presented a dismantling plan in 2027. A more defined timeline is needed given that the MEG experiment ends in 2026 including the requests for X17 data taking plus LXe calibrations. It is very important that the dismantling plan is well coordinated with the needs of the facility in view of the importance of the HIMB installation work. The collaboration must make sure that they move and relocate their equipment as needed by the facility.

R-05-03.1: Measurement of the neutron EDM (n2EDM) (B. Lauss, G. Pignol *et al.*)

The goal of the n2EDM collaboration in 2025 was to demonstrate that the apparatus was complete by collecting physics data. This was successful. However, a handful of equipment failures occurred which meant that the experiment did not work at the design sensitivity. These failures appear to be understood and will hopefully be corrected before the 2026 run.

It is unlikely that the full array of Cs magnetometers will be available in 2026. As there is some redundancy in this array, the collaboration does not expect the lack of a full array to impact the EDM sensitivity or systematic uncertainty. The independent analysis teams are prepared for blind analysis.

The committee endorses the plan for n2EDM to receive priority for UCNs. For a future 2027 beam-time request, the committee recommends that the collaboration plans for beam time only up to the end of September 2027, due to the early TATTOOS work. Of course, they should keep informed of possible changes to this date as the time approaches.

R-12-01.2: Studying the "Proton Radius Puzzle" with μp elastic scattering (MUSE) (E. Downie, R. Gilman *et al.*)

MUSE had a very successful beam time in 2025 accumulating more than 7×10^9 events, which is above the design goal. They also upgraded their detectors and obtained important information on the relative beam momentum. For 2026 MUSE plans to study a variety of systematic effects. The committee supports these requests and asks that the collaboration

advance their analysis as far as possible to best inform the proposed systematic studies. The committee recommends allocation of 10 weeks of beam time in πM1.

R-12-03.1: Search for the decay $\mu^+ \to e^+ e^- e^+$ (Mu3e) (A. Schöning, St. Ritt *et al.*)

The Mu3e experiment proposed an ambitious 2025 program, and the committee congratulates the collaboration for its excellent progress and for achieving most objectives despite limited beam time. The three-week beam run, together with extensive cosmic-ray testing, advanced the experiment across beam and detector tuning, system-level integration, operational stability, and early data analysis. The collaboration gained essential hands-on experience and recognized that several commissioning tasks cannot be accelerated.

Given the large overbooking of the πE5 area, the committee recommends to conditionally allocate only 8 of the 16 requested weeks. The focus should be on technical commissioning of the new detector components to optimize data taking in 2027. Commissioning of the GPU farm is essential, but the required time should be minimized by training the system with Monte Carlo samples based on observed tracks. While task prioritization rests with the collaboration, efficient execution should allow at least one week of background data-taking under realistic high-rate conditions. For allocation of beam time, the collaboration should demonstrate readiness in June via a readiness report that includes answers to the questions in the subcommittee report.

A detailed report from the subcommittee will be provided.

R-14-02.1: Development of high-intensity muon beams (muCool) (A. Antognini *et al.*)

The muCool collaboration had a very successful 2025 beam time as presented in their report. This included first detection of extracted muons from the muCool gas target with an upgraded detector system. Initial analysis indicates significant muon stopping and compression along with high extraction efficiency. While no beam time was requested for 2026, the analysis of the data will continue. The committee acknowledges the important progress demonstrated so far and encourages the collaboration to continue with their development work.

R-16-01.1: MuX (A. Knecht *et al.*)

The committee supports the goals of performing a measurement of X-rays from muonic radium as well as commissioning a new cryogenic liquid hydrogen target for future low-target-mass measurements or for multiple targets. This target could be useful for the ReferenceRadii and QUARTET experiments. For this year's request, muX and ReferenceRadii will use the IDS germanium detector array from CERN/ISOLDE. The committee recommends a beam allocation of 1 week in πE1 during a period adjacent to the ReferenceRadii allocation. If a Ra $2p \to 1s$ X-ray signal is seen, the committee recommends that enough data be taken to get good statistics. If necessary, the time could come from the ReferenceRadii beam allocation.

R-16-02.1: HyperMu/CREMA (A. Antognini *et al.*)

The committee acknowledges the substantial progress achieved by the collaboration in preparing for the first measurement of the ground-state hyperfine splitting in muonic hydrogen. This experiment addresses a key open problem in precision physics, namely the determination of proton structure effects in the hyperfine interaction. The committee notes the impressive level of technical maturity reached by the experiment

For 2026, the collaboration proposes running at the πE5 beamline with the primary goal of performing a full system integration test under realistic experimental conditions. The committee considers this step essential and well justified as a prerequisite for the planned high-statistics physics measurement foreseen for subsequent beam periods. Given the relevant scientific motivation, the demonstrated technical readiness, and the long-standing track record of the CREMA collaboration in delivering high-impact results, the committee supports this effort. However, due to the oversubscription in πE5 the committee recommends allocating 4 weeks of beam time for HyperMu/CREMA in 2026.

A detailed report from the subcommittee will be provided.

R-19-01.1: MuMass (P. Crivelli *et al.*)

MuMass aims to measure the $1S$-$2S$ transition in muonium. This would lead to a ppb determination of the muon mass, tests of bound-state QED, and set stringent limits on Lorentz/CPT violation in the muon sector and on new physics coupled to muons and electrons. It has been running regularly at the low-energy muon (LEM) facility, making steady progress towards achieving their goals. For 2025 they re-established the set-up for an engineering run. Despite a number of technical challenges they were able to demonstrate a low background level compatible with their goal. They plan to attempt a first physics run for the $1S$-$2S$ transition in 2026. As this experiment currently runs in the LEM area, it is not scheduled by this committee. However, the physics addressed by MuMass is of great interest to our committee and it is strongly endorsed. Because of the close scientific connections, the committee wishes to remain informed about the progress and plans for this experiment.

R-21-02.1: Search for a muon EDM (MuEDM) (P. Schmidt-Wellenburg, A. Papa *et al.*)

The muEDM collaboration has made significant and impressive progress in 2025, although they fell short of their ambitious goals. The collaboration is well organised and has significant support from their member institutions. The 2025 run identified a number of technical issues that should be solvable before beam time is available in 2026. The goals for the 2026 run are a characterization of the muon injection and transmission, and demonstration of muon storage and frozen spin, with a goal of observing the $(g-2)$ precession. This will demonstrate readiness for a measurement of the muon EDM in 2027. The committee recognizes the value of a physics data run before the shutdown and the committee recommends the requested beam time of 6 weeks in πE1.

A detailed report from the subcommittee will be provided.

R-21-03.1 MuFusE (A. Knaian, K. Lynch *et al.*)

The committee acknowledges the substantial technical and scientific progress achieved by the MuFusE collaboration during the 2025 beam period. The experiment successfully operated under unprecedented pressure, density, and temperature conditions for muon-catalyzed fusion, significantly extending the parameter space explored by previous experiments. Multiple cryogenic loading and compression cycles were completed, including DD and DT runs with different isotopic compositions, together with a fourfold increase in target volume that reduces systematic uncertainties from wall interactions. Clear DD and DT fusion signals were observed well above background, with time and energy structures consistent with fusion cycling.

While the experiment has been continually upgraded, the committee considers 2026 could be best used to (i) analyze the existing data toward publication, (ii) upgrade the apparatus to its final configuration, (iii) demonstrate stable target operation over the full planned range and (iv) demonstrate its capability to determine accurate sticking values.

Due to the severe overbooking of the πE1 beamline the committee does not recommend allocating beam time to MuFusE in 2026, but renews its support for MuFusE's scientific objectives.

R-22-01.1: Studies of rare pion decays (PIONEER) (D. Hertzog *et al.*)

The committee is happy to see significant progress in 2025 on the active target, track reconstruction, analysis frameworks, calorimeter,DAQ and trigger.

The committee finds that the requested πE5 phase-space measurement is well justified. It is design-critical and directly impacts the beamline optics, the detailed calorimeter geometry and background suppression concepts. The requested πM1 SiPM studies in LXe are also well justified. However, due to the oversubscription in πE1, the committee requests that the collaboration investigate using πM1 for the ATAR studies. The committee thus recommends the following beam allocations: 1 week in πE5 for phase-space studies, 1 week at πM1 for SiPM tests and 3.5 weeks in πM1 for ATAR studies assuming πM1 can be shown to be useful.

A detailed report from the subcommittee will be provided.

R-22-02.1: LEMING (A. Soter *et al.*)

The committee acknowledges the significant progress achieved by the LEMING collaboration toward the first demonstration of muonium interferometry and the longer-term goal of a gravitational free-fall measurement of muonium.

For the next period, the committee considers the proposed goals to be well defined and realistic, focusing on the first demonstration of muonium interferometry using the updated interferometer design and the full detector system. In view of the progress achieved, the remaining technical challenges, and the clear scientific motivation, the committee recommends allocating the requested 3 weeks of beam time at πE1 to pursue these objectives. The committee further requests that the collaboration produce a TDR along with a new proposal before the experiment moves to its final requested location in πE5.

R23-01.1: τSPECT (M. Fertl *et al.*)

The τSPECT experiment had a fairly successful 2025 run time. They accumulated sufficient statistics for a neutron lifetime extraction with an error of 2 s. For 2026 they anticipate significant improvements in the experiment allowing them to achieve lifetime sensitivity below 1 s. The committee recommends the experiment be approved for the requested beam time and expects the collaboration to continue working closely with n2EDM for allocating the available UCN with priority given to the successful operation and running of n2EDM. For a future 2027 beam-time request, the committee recommends that the collaboration plans for beam time only up to the end of September 2027, due to the early TATTOOS work. Of course, they should keep informed of possible changes to this date as the time approaches.

R23-02.1: QUARTET (B. Ohayon *et al.*)

The committee acknowledges the excellent progress achieved by the QUARTET collaboration which has successfully demonstrated the capability of high-resolution muonic atom spectroscopy with magnetic microcalorimeter detectors for precision extractions of nuclear charge radii of light nuclei.

Given the excellent performance during the previous beam periods, the clear scientific case, and the demonstrated readiness of the experimental setup, the committee recommends allocating the full 3 weeks of beam time requested at the πE1 beamline for QUARTET in 2026.

R-23-03.1: ReferenceRadii (T. Cocolios *et al.*)

The collaboration reported on mature analyses for several isotope chains, including previously measured and newly analysed targets, with demonstrated precision at the 10^{-4} level in relative radii. Further measurements of new isotopes are proposed for 2026 using the established gas-cell and muon-transfer method together with the IDS HPGe detector array.

Taking into account the oversubscription in πE1, the committee recommends allocation of 2 weeks of beam time for Reference Radii, with the focus on a reduced target set.

4 Miscellaneous

This year there were extended reviews on Tuesday for muEDM, PIONEER, Mu3e, and CREMA. This was the last BVR committee meeting for Cy Hoffman. The committee would like to thank him for his long-lasting pivotal work.

The shutdown for the installation of HIMB has been moved by one year. Hence, there will be beam time available in 2027, even though some beamlines might not be available for the full year.

5 Next Meeting

The next meeting (BVR 58) is again planned as a 3-day meeting and will take place from Monday to Wednesday, 1–3 February 2027. The deadline for proposals and beam-time requests is 15 January 2027.

All requests require a short written report. It is planned to organise the submission including the report as upload through Indico or DUO. Furthermore, the introduction of a page limit was discussed favourably. Details will be provided to the applicants in due course.

March 17, 2026 B. Filippone, A. Signer