

Minutes of the aMUSE Scientific Board Meeting 22 March 2022 - 9:00 am CET

Attendees: M. Casarsa (INFN-Trieste), F. Collamati (UniRM), M. Fertl (JGU), S. Giovannella (*chair*, INFN-LNF), F. Happacher (INFN-LNF), S. Müller (HZDR), A. Papa (PSI), F. Renga (UniRM), M. Silarski (JU), D. Stöckinger (TU), L. Zoia (UniPD)

Excused: G. Burzachechi (FS), E. Diociaiuti (INFN-LNF), A. Ferrari (HZDR), M. Gallinaro (LIP), M. Incagli (INFN-Pisa), D. Lucchesi (UniPD)

Agenda:

1. Election of the SB chair
2. Data Management Plan
3. Advancements, plans and schedule from Working Groups
4. a.o.b.

S. Giovannella informs the board that the chair of the Scientific Board must be elected among SB members, and points out the duties of this role:

- Organize and chair Scientific Board meetings
- Draft minutes
- Supervise the drafting of the biannual periodic report
- Periodically report to the Management Board

A. Papa gives her availability to cover this role. The board approves and thanks her for the willingness to serve in this role.

S. Giovannella reports the news from Work Package 7, “Management”. The first official aMUSE event, the kick-off meeting, was a success. There was a high attendance, with about 60 participants connected from 7 different countries. She thanks the SB member for the organization of the event and for the high level of the presentations. The first aMUSE secondments to Fermilab started on February 2022 for Mu2e and Muon (g-2) INFN groups.

The other institutions are planning travels for the Summer. The first two aMUSE deliverables (D7.1, "aMUSE kick-off meeting" and D7.7, "aMUSE website") were completed and the first milestone (M14, "Management Structure in place") achieved in due time. The related information was submitted to the European Commission website.

The aMUSE website is taking shape. The first dissemination and outreach events are posted in the public section, and the upcoming events and the last news are highlighted in the home page. The slides presented today at the SB meeting will be posted on the event page at the following link: <http://amuse.lnf.infn.it/event/sb-meeting-march-2022/> .

S. Giovannella reminds the rules for papers: all aMUSE related papers must be open access (a free repository such as arXiv is enough) and must acknowledge the project with the following sentence: *This work was supported by the EU Horizon 2020 Research and Innovation Program under the Marie Skłodowska-Curie Grant Agreement No. 101006726*. This sentence is already in the official acknowledgements of the Muon (g-2) and Mu2e experiments.

S. Müller presents a path towards the definition of the aMUSE Data Management Plan (DMP), which is the next due deliverable and whose estimated completion date is 30 June 2022. He discusses the FAIR principles to handle research data and mentions the Horizon 2020 guidelines on Open Access and Data Management. There are tools available to plan and carry out data management, such as DMPonline and RDMO. For the last one, a local instance is available at HZDR. There are a list of issues to be discussed and agreed to define how to organize aMUSE research data. WP conveners will be contacted soon to identify needs and requests from each Work Package.

M. Fertl reports activities connected to Work Package 1, "Muon Campus Experiments". The Muon (g-2) Run 5 is in progress, accumulating statistics as planned except for few stops mainly due to water leaks. In the meanwhile, the analysis of Runs 2/3 is making significant advancements, and a new result is expected by the end of the year. The next run (Run 6) will use negative muons for CPT studies, thus requiring the reversal of the ring system polarities. Four months of g-2 beam shutdown are foreseen, with a lot of scheduled activities on site. Several aMUSE researchers will be present at Fermilab to contribute, including the Summer Shutdown Coordinator and the Magnetic Field Shutdown Coordinator. Concerning Mu2e, all calorimeter components are ready and tested except for the FEE boards still under test and the digitizer boards, under production. The mechanical structure is being manufactured and will be shipped to Fermilab for assembly in spring 2022. A successful dry run of mechanical integration in Frascati allowed the tuning of the mounting sequence and cable routing optimization. From the theoretical side, several papers have been produced in the last months, focused on the hadronic contribution to the anomalous magnetic moment. Some activities are also in progress on two open access software packages focused on BSM contribution: GM2Calc and FlexibleSUSY. At present, there are one PhD and three Master thesis students working on WP1 theory aspects at TUD.

F. Renga presents the work in progress on Work Package 2, "Muon Campus Upgrade", involving INFN, HZDR, UniRM and PSI researchers. In the last weeks the activity was mainly concentrated in finalizing contributions to Snowmass. In the future, progresses are expected both on R&D for calorimeter crystals and conceptual and simulation studies for muon decays.

S. Mueller reports FLUKA activities within Work Package 2. The goal is to cross check the official GEANT4 Monte Carlo results on the muon beam line with a different simulation

package. The work is currently concentrated on the simulation of different production target design, both in shape and material.

M. Casarsa presents the activities on Work Package 3, “Muon Beams”. All of them are progressing as expected. The study of the characterization and mitigation measures of the beam induced background (BIB) is currently focused on a 3 TeV muon collider. As CERN is working on the design of a 10 TeV machine, efforts on BIB at that energy will eventually be joined. The studies of the detector response and performance at $\sqrt{s} = 1.5$ TeV was presented at the Snowmass meeting; work has started for the 3 TeV configuration. The longitudinal and transverse cooling of low energy muon beams has been demonstrated by the PSI group. Currently, the effort is concentrated on the preparation of the setup for extracting positive muons in vacuum.

F. Collamati presents the ongoing activities for Work Package 4, “Simulation Tools”. In the last weeks, there was a big effort to contribute to Snowmass 2021 papers. The team is consolidating within the International Muon Colliding Collaboration, with regular monthly meetings. Local software repositories are being transformed to public and are now available to all participating institutes. There is a milestone connected to WP4 to be delivered this year: M10, “Benchmark on ILC software”, whose delivery date is December 2022. The University of Padova is in charge of this. The conveners will contact the local responsible to check the progresses on this.

The aMUSE outreach program is progressing. In February, two aMUSE researchers presented their experience in STEM careers from a female and male point of view to celebrate the 2022 International Day of Women and Girls in Science during the event organized at the Frascati National Laboratory of INFN: “Towards Inclusive Science”.

S. Giovannella comments that there is a further milestone to be achieved by December 2022: M12, “Planning of irradiation tests”. Contacts between the HZDR team and CAEN started to define the needs of the company. Irradiation tests are also foreseen for the components of the Mu2e-II calorimeter. S. Müller informed the board that there are two calls per year to access the ELBE beam time. The deadline for the first call is April 12th, while the second one should be around October, and covers beam time for the first half of 2023. This seems to be the right call where to submit aMUSE proposals.

The meeting is adjourned at 11:40 am CET. Presentations with reports from Working Groups are available at the event web page <http://amuse.inf.infn.it/event/sb-meeting-march-2022/>

The next Scientific Board meeting will be held in June 2022.