

Magnet Meeting Mu3e-Danfysik 23rd September 2015

Web: <https://indico.psi.ch/conferenceDisplay.py?confId=3938>

Participants:

Nils Hauge, Magnetics

Christian Glarbo Pedersen, SC and cryogenics

Kasper Gade, Mechanics

Michael Pedersen, Project management

Sig Martin (consultant)

Felix Berg (area planning + beamline)

Andreas Knecht (area planning + muon physics)

Peter-Raimond Kettle (beamline + optics)

Dirk Wiedner (Technical coordinator)

Stefan Ritt (PSI group leader + Mu3e co-spokesperson)

After a welcome and the introduction about the muon beamline given by Peter-Raymond Kettle, we went to the experimental hall in order to share the considerations concerning the available space at the experimental area used for Mu3e.

In this context Danfysik raised the question if the size of the magnet could as well be increased to 3.2m length, 2m height and 2m width. Since the space in the experimental area is very limited Felix Berg agreed to check the available space using the preliminary technical drawings provided by Danfysik. It was also discussed to round off the edge of the magnetic shielding at the edge closest to the wall or to achieve a similar effect by replacing the 90 degree edge with two 135 degree edges.

It was discussed that Danfysik would prefer to produce the main coil as 5 separate units, which will be only 3mm apart from each other. The preferred wires would have 0.6mm for the main coil and 0.7 mm for the correction coils at both ends.

The interface between the warm bore and the rails for the detector systems inside was discussed. Danfysik and Mu3e agreed that it makes sense to foresee the rail mounting holes and threads already in the magnet design and Stefan Ritt suggested providing multiple possibilities to mount instruments inside the warm bore.

It was discussed how to implement an alignment system which makes it possible to determine the position of the coil inside the magnetic shielding.

The interface mechanical between magnet including shield provided by Danfysik and the foot/stand provided by PSI was discussed. It was agreed that once Danfysik proposes the placement of the three to

four feet of the upper part, PSI can build the stand optimized for stability in those three to four areas. It was agreed that Danfysik will include the screws allowing adjusting the height of the upper part including magnet system with shield.

The establishment of the magnetic field map was discussed. Danfysik has the means to measure the magnetic field at their fabrication site. Mu3e think they can modify the magnetic field measurement tools used for MEG to measure the field at PSI.

An octagonal realization of the magnet shield was shown by Danfysik. The front and back shields can be taken off with the help of eyes for the crane hook. The estimated weight for a half door is around 1.1t, the suggested crane capacity was 2.5 or 3t accordingly. It was discussed to have a crane system installed on the ceiling above the magnet system.

The holes in the magnet shield for the Mu3e detector signal, power and control cables as well as for other services like cold gas and cooling liquid were discussed. It was concluded that the two 100mm holes on each face of the magnet should be placed below and above a central 300mm hole (for the beam interface), so that the two half doors of the shield can be taken off without removing the cables. Andreas Knecht suggested mounting the lid of the cable and service feed-through outside of the magnetic shield. This would mean to enlarge the holes in the shield further, which was considered an option.

It was recommended to never move the magnet with the (big) crane when cold.

It was discussed how to connect the cryo compressors to the magnet. The hoses necessary have a diameter of approximately 50 mm and a bending radius of 50cm. It was discussed where to put the connections for these hoses on the magnet, a central position on the left or right side of the magnet looking in the direction of the beam was favored. Felix Berg agreed to include this connection into the CAD of the area so a decision can be made based on the best passage for the hoses.

Mu3e asked how large the power supplies for the magnet would be. Danfysik suggested providing a list of power supplies, pumps, coolers etc. including mechanical dimensions, so Mu3e can refine the area planning.

It was discussed that the pre-pump for the turbo pump should be installed close (no more than 2m away) to the turbo pump. Dirk Wiedner suggested avoiding the mechanical mounting of the pre-pump together with the magnet since the vibrations could have considerable influence on the detector performance. It was also concluded that the turbo pump vibrates little during its lifetime.

A small control crate should be placed in the direct vicinity of the magnet.

Stefan Ritt gave a talk on the slow control interface between the magnet and the Mu3e slow control system, which will be based on MIDAS. Danfysik currently uses PLCs for the control and is willing to do so for the Mu3e magnet. Stefan Ritt agreed that integrating the PLCs via RS232 is a good solution for all sides.

The influence of power failures and cooling water cuts on the magnet and the detector inside was discussed. It has to be studied whether the Mu3e detector will be damaged during a quench of the magnet.

A to do list was made:

- A central repository and a webpage will be established to provide the latest specifications to all parties involved
- To launch the time critical order for the superconducting wires, it was agreed to
 - Check the area planning for a 3.2m long magnet (Felix Berg)
 - Conduct a magnetic field simulation with the newest specifications provided by Danfysik (Sig Martin), the field maps will then be used by Sig Martin, Felix Berg and Nik Berger to validate the magnet design and to suggest going ahead.
 - To check the quench system (Danfysik)
 - All parties aim at concluding these tasks until Friday 2nd October 2015, so a decision on the wire acquisition can be taken then.
- A complete list of external components for the magnet operation will be prepared by Danfysik, so Mu3e can suggest a placement in the experimental area.
- Danfysik requested to delay the shipment date of 31.8.2016, Mu3e will take a decision on this request in an internal meeting, since this has significant influence on the global schedule.
- The next meeting was proposed for the 19th October 2015, if possible at PSI. In this meeting the technical design review should be prepared.
- The technical design review has been scheduled for mid-November.

Dirk Wiedner, 23 September 2015