Minutes of the Magnet Group Meeting
Ferrara, 9 Sept. 2008

Inti Lehmann and Andrea Bersani

11th September 2008

Participants

Andrea Bersani, Inti Lehmann, Yuri Lobanov, Herbert Orth, Renzo Parodi, Dieter Prasuhn, Lars Schmitt, Jerzy Smyrski, and a bit delayed: Edward Lisowski, Michela Greco, Mauro Savrie, Dario Orecchini and Bruno Dulach.

Minutes

1. The minutes of the last meeting were accepted.

2. Yuri held a talk specifically addressing topics which seemed to be crucial. This talk was extensively used to discuss problems and features of the design. He summarised the main dimensions of the solenoid and showed many technical drawings. For the details, please consult his presentation or the TDR. The following items were discussed during his presentation and are quite often related to what he showed.

3. We had a discussion about the coil distribution, i.e. the number of windings in the three sub-coils. The symmetric configuration (232:104:232) is the one used for Jost Lühning's field map calculations and it's the configuration which is agreed by everyone.

4. The iron yoke layout is almost unchanged w.r.t. the last meeting save for the change of the upper recess for the target. The recess has changed from a round hole of 1 m diameter to a rectangular hole with rounded corners of 1 m $\times$ 1.2 m in x and z, respectively. The recess is also deepened to 62 cm with only 19 cm of yoke remaining in that region. Furthermore, in this remaining part the hole has been opened from 350 to 500 mm diameter in the outer part.

5. Inti asked why in this design the downstream door is thinner and has a different geometry than discussed in our last meeting. Lars agrees that it is probably preferable to have all plates equal. Yuri agreed to change that to the agreed dimensions as stated in the minutes from the previous meeting and the Draft Interface Document, i.e. the door occupies the space between 2485 and 2905 mm in z. Then all the plates are equal and the door becomes a little more heavy. Yuri does not expect other significant differences. There was agreement that with that there remain no open issues concerning the geometrical layout of both the upstream and downstream doors.

6. Following a suggestion by Yuri we discussed to replace the definitions in table of field requirements in the Draft Interface Document by $I(r, z_0) = \int_{z_0}^{-400} B_r(r, z)/B_z(r, z)\, dz$ and $|\Delta B|/B_0 < 2\%$, where $\Delta B = (B - B_0)$. The definition of B_0 has been discussed in some detail. It was pointed out that to set it just equal 2 T would not foresee a case where we would run PANDA at a lower field. It was agreed that one should phrase it as being equal to the nominal field. For PANDA standard operation this is just 2 T.

7. The magnet field in the region of the new target-generator recess has been studied by the Dubna group. Introducing the recess, the field merely reaches 5 mT at 2 m radius where the turbo-molecular pumps (TMPs) should be placed. Yuri suggests to put some iron between the lamination in the region of the recess to make sure that the requirement of staying below 5 mT is kept safely. He showed that this reduces the field such that this requirement is reached already at 1.9 m radially. Everybody agreed that, as this seems to have no negative implications, we should pursue that way.

8. Yuri asked about the space requirements in the target dump region, to define the recess shape and dimensions. Herbert replied that the target group would be satisfied with the currently implemented recess, i.e. a round recess with 1 m diameter and the inner 30 cm of the yoke with a hole of 35 cm diameter. Of course a larger space would not harm. Therefore, the decision whether to make the recess rectangular or enlarging it is left to the Dubna group.

9. Yuri showed that the magnetic field in this configuration is 1 T at the Barrel DIRC read out.

10. For cable routing gaps have been foreseen between the barrel ends and the doors. In the design presented Yuri foresees slits transverse to the beam direction, while Bernd preferred longitudinal slits, as Andrea reminded. Currently the openings are about 80×8 cm according to Yuri. That would inhibit the routing of the cooling pipes for the EMC, as their thickness is believed to be already 12 cm (as communicated to Andrea by Philippe Rosier) because of the insulation. Lars agreed to check these numbers, such that they enter as requirements into our Draft Interface Document.

    Yuri proposes to use the spacers in the middle of the octagon sides, while Renzo asks why this structures can't be placed in the corners, to improve the mechanical stability. An agreed reason to keep the spacers in the middle of sides is the cable routing. It was agreed that Yuri will investigate various geometries for the slits, both from the magnetic and mechanical viewpoints.

11. Renzo proposed to look at the an option to open the doors of the yoke with a small angle to avoid the problem of friction or the need to dismount dedicated spacers for each opening. He claimed that other similar solenoids use angles of about 1°. This possibility should be considered.

12. Yuri pointed out that in the design a space of 4.75 m is needed on both sides respective to the centre of the solenoid for the door opening both for the upstream and downstream doors. Nothing can be placed there.

13. A point arose about stray fields in regions which can be accessed by humans. It seems that regulations for the access to the experimental area might turn out to be quite restrictive when we exceed a certain limit. Lars will investigate the regulations about this.

14. Inti proposed to make some minor modifications to the WPs which were agreed on in our March meeting and defined in the TDR. This is for consistency reasons and because it cannot be that several institutions are responsible on equal footing for one WP. He shifted and added some points and modified the responsibilities accordingly. There were no general objections. Since this proposal was not distributed beforehand and some people, in particluar Alexander, were not present, it is agreed to go on as Inti proposed, i.e. by sending this list via e-mail and asking for confirmation.

15. Inti showed the Draft Interface Document asking for comments. Of course, further comments will be welcome in the future. He pointed at the inconsistencies / updates which he found in the document. Working directly with the document, the agreed modifications are added by Inti in a PDF version of the document. Some identified updates include:

    (a) The maximal field which the MCP read out of the Barrel DIRC should be at least 1 T and not 0.5.

    (b) Formulae for the field requirements in Table 1 will be updated according tour previous discussion.

    (c) Target requirements will be updated.

    (d) Downstream door lamination will be updated as discussed before.

    (e) Detector support will be updated as soon as Inti figured out the details from Bernd.

    (f) Inti will hunt for the masses missing in Table 2.

    (g) Fig. 4 was identified as conflicting with the current yoke design. This needs to be discussed.

16. As the time for the coffee was approaching the status of the TDR is only flashed by Inti. He guesses that about 70% of the volume has been reached, but as this is not yet revised at all there will be significantly more work required to finalise the document.

17. Dieter Prasuhn mentioned that to have no tune overlaps in HESR he would need to request to operate the solenoid at lower but constant field for measurements at momenta below 2 to 2.5 GeV/c. He thinks that a reduction to 70% would be sufficient. Renzo said that this would be no problem, as the solenoid would anyway be tested first with lower currents. As a consequence the field map may change considerably.