Magnets Working Group Meeting Notes

Magnet Working Group

Date: Feb. 20 2025

Indico

News

- Publications (see indico)
- See HFM workshop presentations of Luca and Daniel Schulte
- ESPPU Report Authorship deadline, must request very soon! *send a reminder email ----

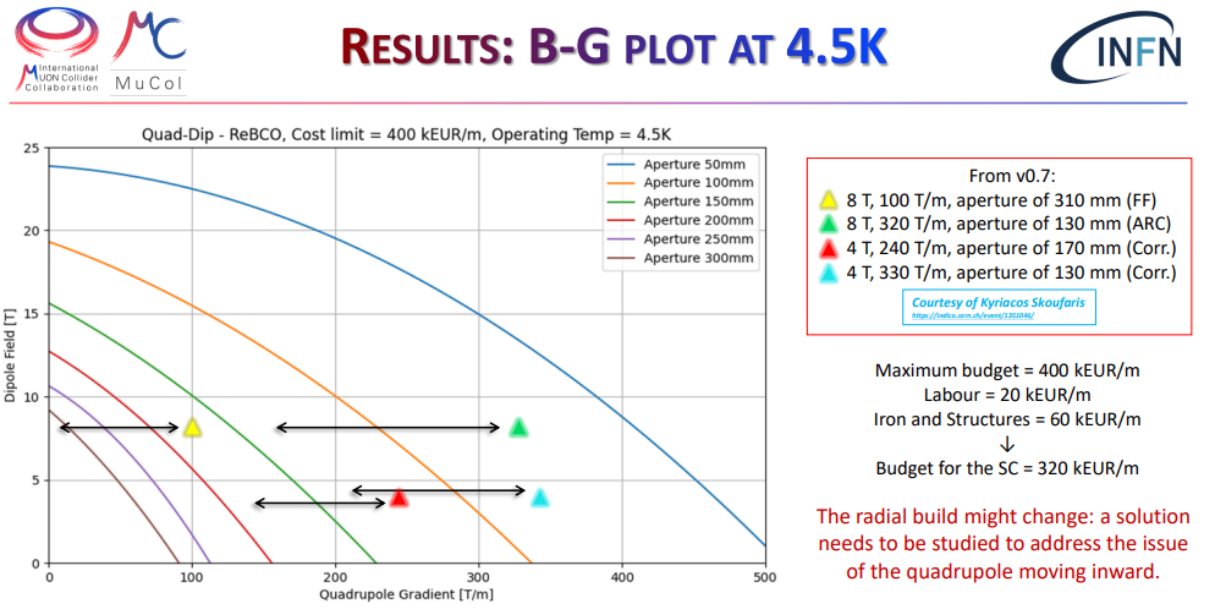
Presentations

Title: **Performance limits of combined function magnets for the collider ring**

Speakers: Daniel Novelli (INFN)

Some key notes

- See B-G (Dipole field versus quadrupole gradient) plots at 4.5 K, 10 K, and 20 K, these are the main summary of the results
    - Example Plot at 4.5 K



- The design targets are shown (v0.7), but corresponding these to the studied aperture (curves in plot), we are not at the target in terms of the gradient
- Slide 11 – Stress issue
- See plot for sextupole combined function magnets (still far from targets)
- Will continue with a specific design study also now including combined function magnets, of a magnet in the allowed space.

Some questions / comments

- Bernardo – extra checks should be done in terms of stresses, such as tensile transverse stress on conductor.

Title: **Tungsten and its alloys**

Speaker: Andres Bersani

Some questions / comments

- Things we need: 1. How much stopping power we need. 2. Look at different alloys, something in non-magnetic class, plans to measure the magnetic properties at 2 or 4 or 10 K.
    - Daniele Calzolari: https://indico.cern.ch/event/1450988/contributions/6259784/attachments/2997754/5282450/RADSUM_Calzolari_25%20_final.pdf (for stopping power)
        - Assumes 3 to 4 cm of pure Tungsten
        - For Alloys, lose 10% of stopping power, so 3 to 4 becomes 3.3 to 4.4 cm
- Scott – why did they use a class 3 beam screen in LHC-HL Upgrade? Why not class 1 class 2… Andrea unsure, maybe something we can ask to Anton.
- Additional input from Anton after the meeting (he could not attend the meeting):
    - The material choice for the collider magnet shielding is indeed a compromise between different factors:
    - *) Ideally, the highest possible density to shield the EM showers (1) --> any reduction of density increases the required shielding thickness and hence coil aperture
    - *) Costs! --> we need 1500-2000 tons for the full collider ring
    - *) Machining and fabrication
    - *) Heat conductivity and heat extraction
    - *) Radiological aspects (radioactive waste production) --> trace amounts of different isotopes can matter
    - *) Vacuum aspects (desorption)
    - *) ...
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    - (1) we don't care so much about neutron absorption since the neutron flux is not excessive in the collider
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    - At some point we have to move forward with the technical design (involving different experts), but for the moment there were no resources available ...
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