Field quality update: D1 and D2

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First short model MBXFS1 (X-section 1)
- Iteration on cross-section for (i) compensating the coil size and (ii) correcting the effect of saturation that was not expected

Second and third short model MXBFS2 and MBXFS3 (X-section 2)
- Second iteration on cross-section to better center the multipoles (20 units of $b_3$ to correct)

Prototype MBXFP1
- Magnet completed in June, tested and reaching nominal current
- Room temperature and 1.9 K magnetic measurements at 12 kA (7 TeV equivalent) are available [https://indico.cern.ch/event/1055554/](https://indico.cern.ch/event/1055554/)

Results
- Large $b_3$ reduction was successful: from 20 units down to 3.5-6.0 units
- There are 6.0-7.0 units of $b_5$, +4 units were expected due to cable size
**D1 - CRYOSTAT ISSUE**

- The test cryostat is affecting the $b_3$ measurement by non negligible amount (6.6 units computed)
  - It will be important to measure D1 prototype in the final cryostat

**Comparison between models (Opera 3D)**

- KEK pit
- CERN cryostat

**NOTE:** 6.6 units difference in $b_3$ between two models even x-section is same
D1 – NEXT STEPS

- The series magnets could have a further fine tuning to center the field quality targets
  - As usual any change is a risk and therefore any decision will take into account for all elements
- Whereas for $b_3$ (expected 3.5 to 6.0 units) we could have some surprises from cryostat contribution, for $b_5$ situation is rather clear: we will have 6.0-7.0 units
  - Note both $b_3$ and $b_5$ sign is positive
- It would be interesting to have simulations of correcting 6-7 units (positive) of $b_5$ in D1 with decapole corrector (knowing that this is consuming 2/3 of the strenght)
D2

- D2 short model (one manufactured, two apertures)
  - Design: -1.2 units of $b_3$, 1.5 units of $b_5$
  - Large compensation of coil size (non nominal shimming)
  - 12 units of $b_3$ of …, 9.5 units of $b_5$
- Fine tuning from short model to prototype (see EDMS 2472430)
  - Reduction of 4 units of $b_3$ and $b_5$
- Prototype magnet has been completed in July
  - Also in this case, non nominal shimming
- Measurements of prototype done in stage of single aperture, and both apertures together
  - Expected at 12 kA 10-12 units of $b_3$, 11 of $b_5$
  - The most precise measurements (with iron yoke) will be done this week
D2 – NEXT STEPS

- With modification of the insulation scheme we could have -2 units of $b_3$ and 8 units of $b_5$
- An alternative is a modification of 2 wedges out of 10, giving 1-3 units of $b_3$ and 5-6 units of $b_5$ (within our targets)
- The modification of wedges would also allow to correct the coil size, avoiding to start the production in a corner
  - There is a general consensus on going in this direction
- This week we will have the magnetic measurements with the yoke, and based on this we will take a decision on the wedges

- It would be interesting to test the possibility of compensating large values of $b_5$ in D1 and D2, with the same sign (e.g. 5 units of $b_5$ in D1 and the corresponding values scaled with power of beta function in D2)