



WP3 field quality update

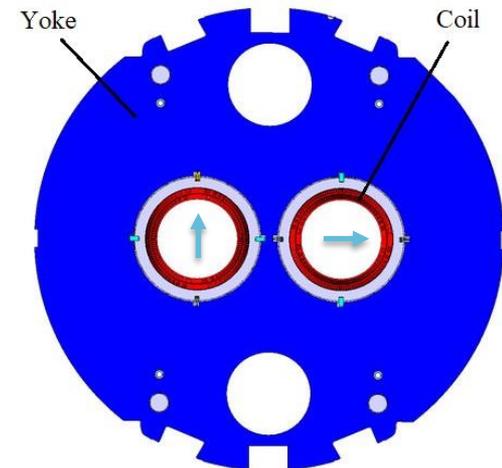
E. Todesco, S. Izquierdo Bermudez, L. Fiscarelli, G. Ambrosio, G. L. Sabbi, et al.



8 December 2020, WP2 meeting

D2 CORRECTOR

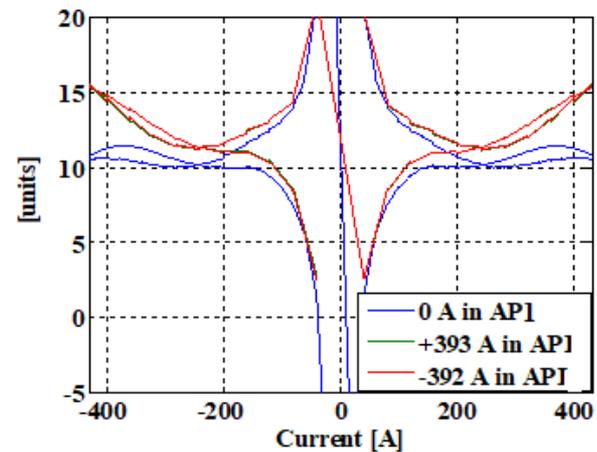
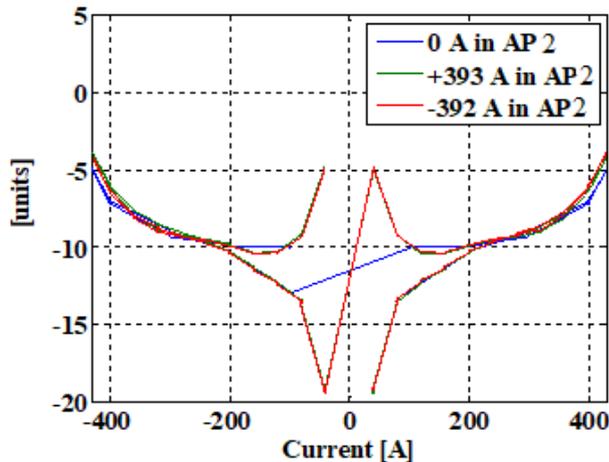
- Recap of naming
 - From connection side Ap.1 on the left, Ap. 2 on the right
 - All magnets have vertical dipole (i.e. horizontal kick, H label in the circuit) for Ap. 1, and horizontal dipole (i.e. vertical kick, V label in the circuit) in Ap. 2
 - Note that in the LHC, the MCBC and the MCBY have half and half (type A or B)
 - We are reviewing all test reports to account for the good convention
 - Some old slides could still have wrong naming



- Convention for multipoles
 - Normalized to the main field absolute value
 - The angle is referred to the reference system (x – radial, y – vertical) therefore we have 10 units of systematic b3 in Ap. 1 and -10 units of systematic a3 in Ap. 2

D2 CORRECTOR

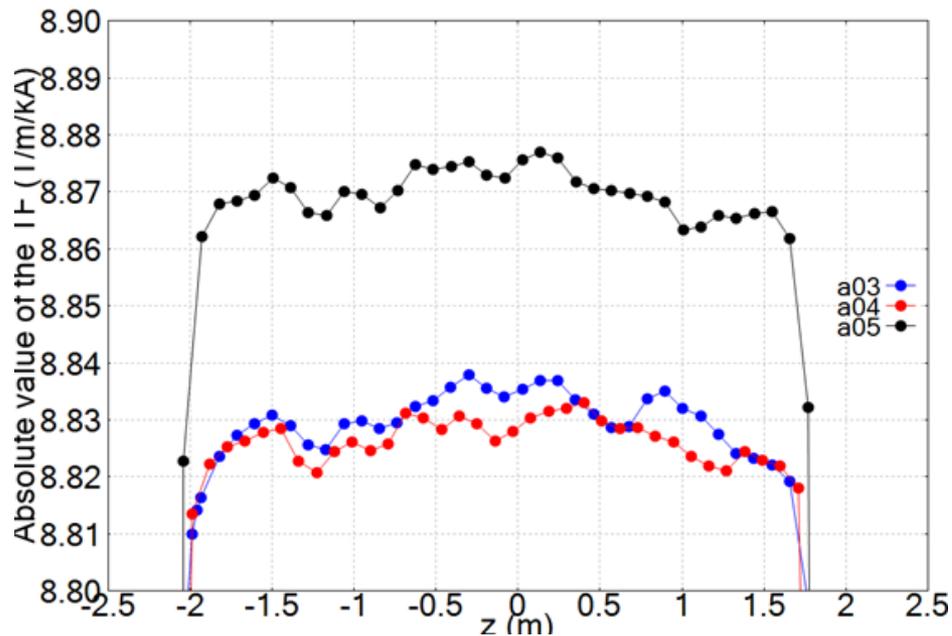
- All data confirm the ± 10 units of geometric b_3/a_3
 - This is at the edge of the specification
 - For Ap. 1, saturation always pushes the b_3 down to 5 units
 - For Ap. 2, the powering of Ap. 1 pushes a_3 towards 15 units
- This is the reason for which we are carefully analysing this issue and trying to centre the geometric around zero
 - More information at the beginning of next year



TRIPLER TRANSFER FUNCTION

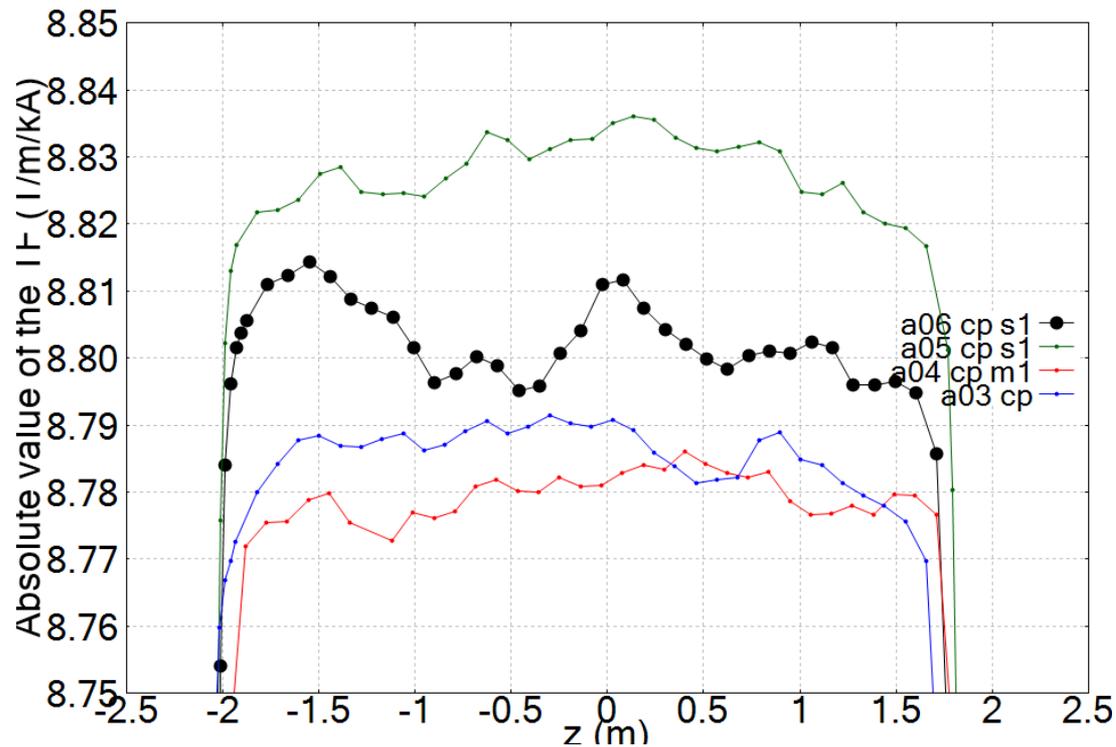
- Available measurements: assembled magnet at room temperature: 03, 04, and 05
 - MQXFA05 40 units larger than previous two

Name	Central TF (T/kA)	Integral TF (T m/kA)	Diff to MQXFA03 (%)
MQXFA03	8.830	37.200	-
MQXFA04	8.828	37.178	-0.06%
MQXFA05	8.870	37.350	+0.40%



TRIPLER TRANSFER FUNCTION

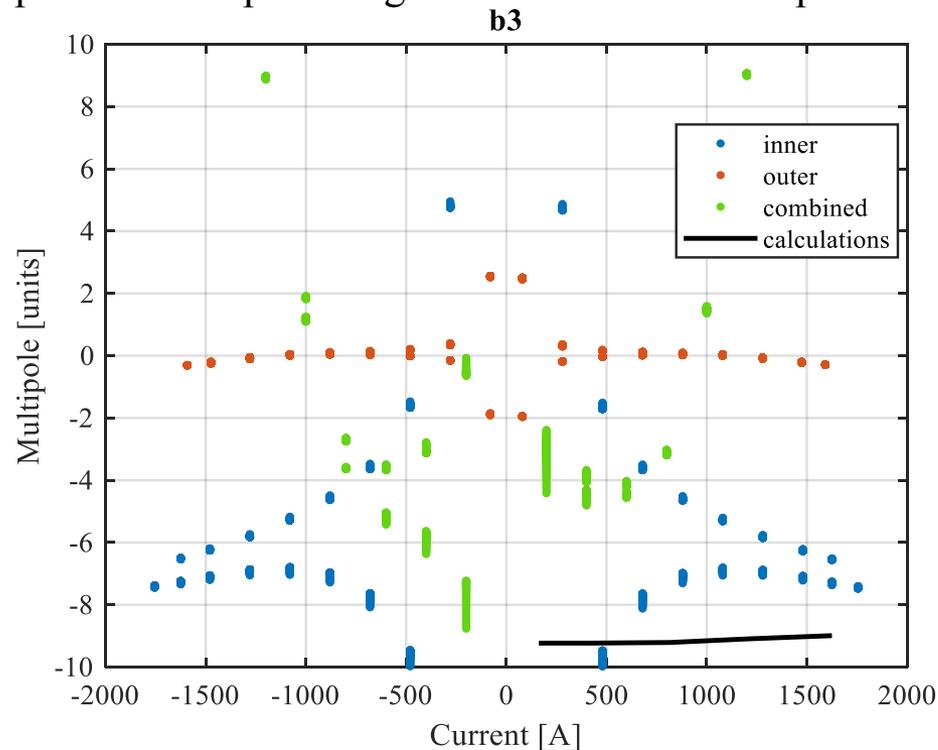
- Available measurements: coil pack (room temperature): 03, 04, 05 and 06
 - MQXFA06 is placed in between MQXFA05 and MQXFA03/4
 - Difference between 05 and 06 around 0.25% (25 units)



MCBXFB

■ Measurements of MCBXFBP2

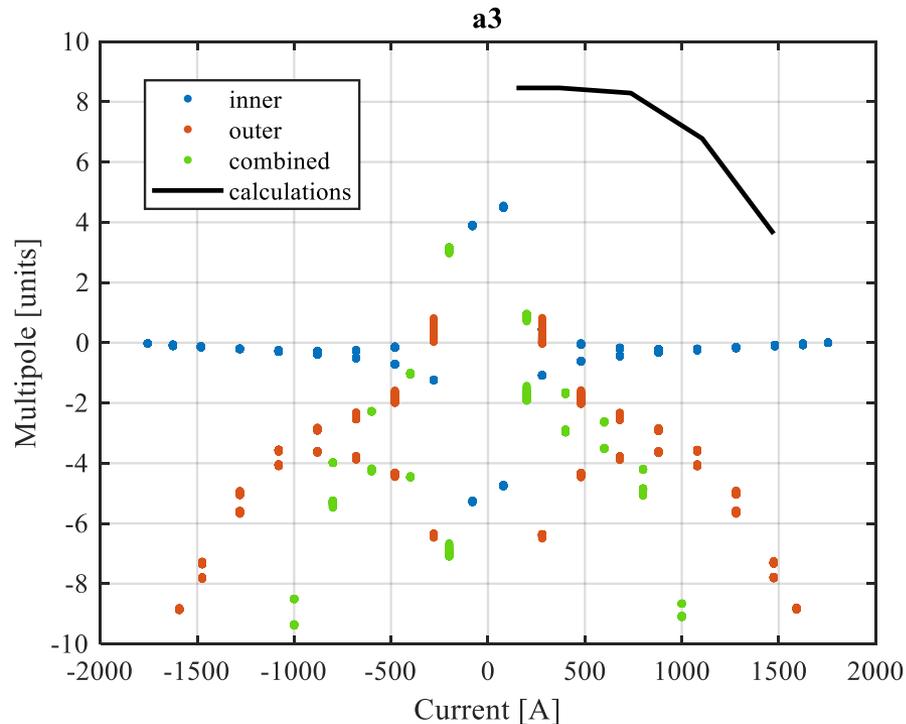
- Careful optimizing of shimming for getting good preload and reasonable field quality
- b_3 perfectly centered:
 - -7 units for inner dipole only
 - 0 units for outer dipole only (by symmetry)
 - About 10 units for combined powering
- b_3 saturation depends on the powering ratio inner/outer and spans 20 units



MCBXFB

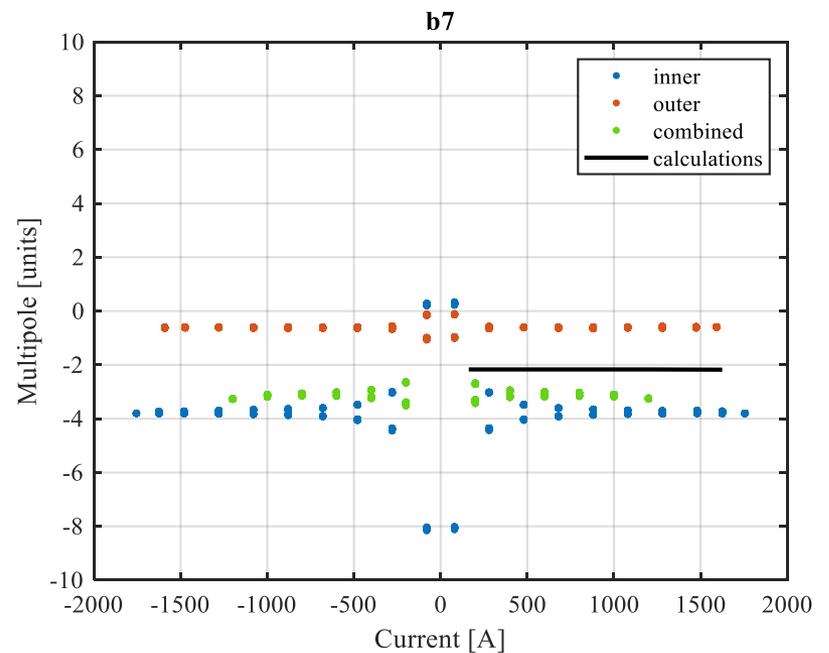
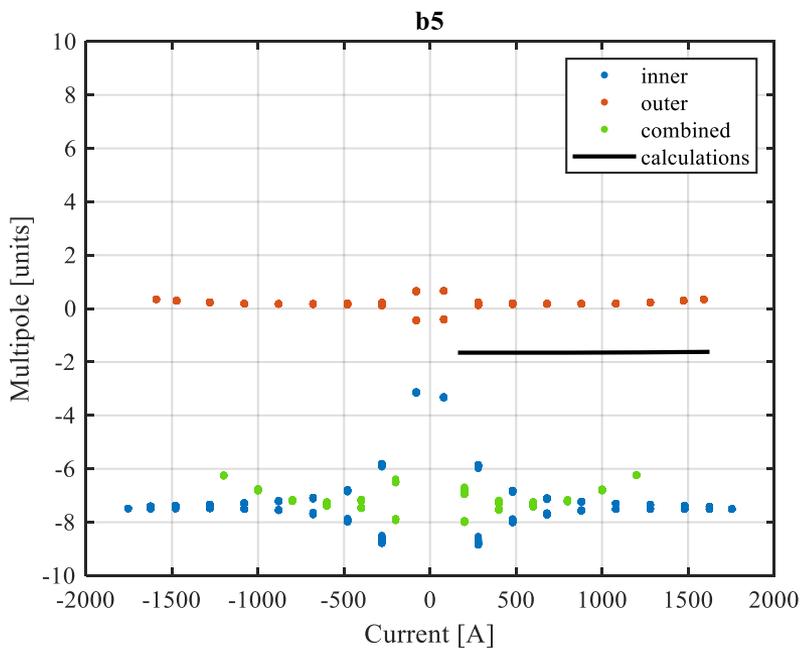
■ Measurements of MCBXFBP2

- Careful optimizing of shimming for getting good preload and reasonable field quality
- a_3 should be centered around 10 units to compensate saturation, it is around zero:
 - 0 units for inner dipole only (by symmetry)
 - -10 units for outer dipole only
 - About -10 units for combined powering at 1000 A in each aperture, and increasing towards 20 units at 1500 A
- a_3 saturation depends on the powering ratio inner/outer and spans 20 units



MCBXFB

- Measurements of MCBXFBP2
 - Careful optimizing of shimming for getting good preload and reasonable field quality
 - b_5 , b_7 well below 10 units
 - Other not allowed below 5 units



A TENTATIVE TABLE

- For the present situation of MCBXFBP2

H kick (V inner dipole)	V kick (H outer dipole)	b3	a3
nom	0	-7	0
nom	nom	10	-20
0	nom	0	-8
-nom	nom	10	-20
-nom	0	-7	0
-nom	-nom	10	-20
0	-nom	0	-8
nom	-nom	10	-20

SUMMARY

- D2 corrector
 - We reviewed the naming conventions, and we show why the 10 units of geometrics do not fit the requirements
 - Study of the influence of key position and iron shape, results in the first months of 2021
- MQXFA
 - We presented the data of 4 magnets, we are within a band of 0.4% (40 units) width
- MCBXFB
 - We presented the data of the second prototype, b3 very well centered, a3 has 10 missing units but they both stay within 20 units target