



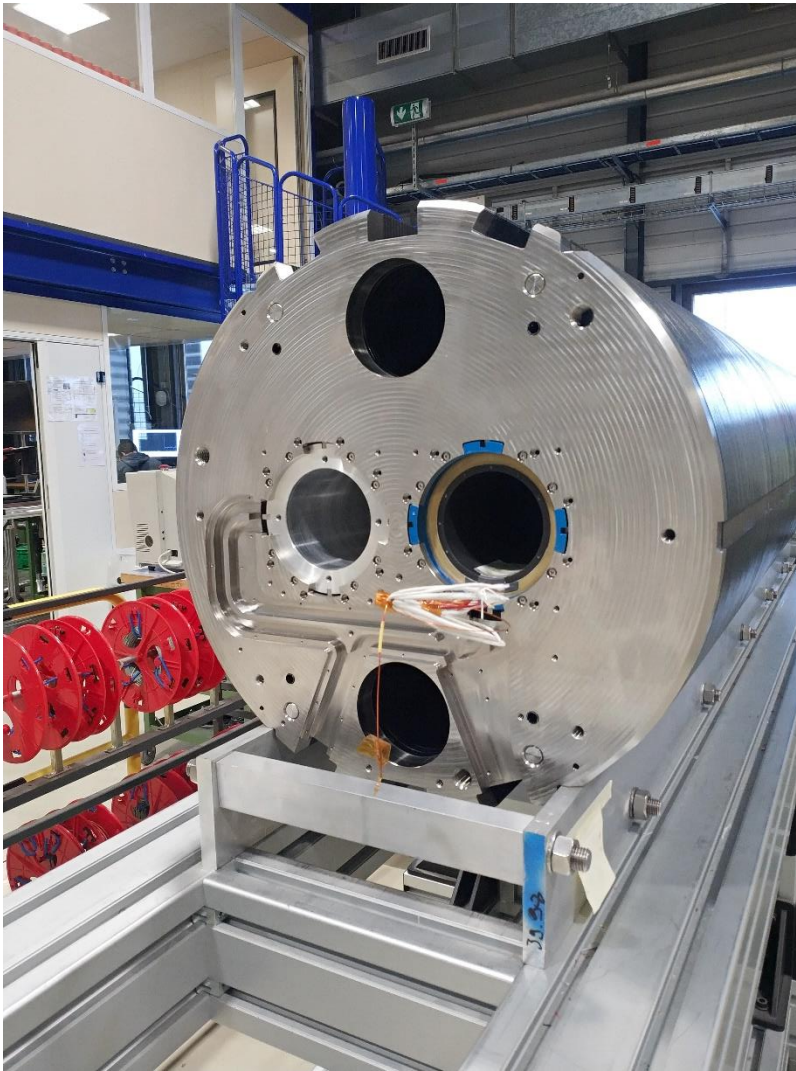
**Magnetic measurements
at ambient temperature
on MCBRDP3a with non-magnetic keys
(D2 corrector prototype)**

WP3 meeting, 20/01/2021

Up to now...

- First aperture of the short model without yoke at room temperature
16 Jan 2018
- Both apertures of the short model at cryogenic temperature
27 Jun 2018 <https://indico.cern.ch/event/738022/>
- Both apertures of the MCBRDP1 with yoke at room temperature
12 Sep 2018 <https://indico.cern.ch/event/753441/>
- One aperture of the MCBRDP1 at cryogenic temperature
21 Nov 2018 <https://indico.cern.ch/event/773207/>
- Both apertures of the MCBRDP1 at cryogenic temperature
13 Feb 2019 <https://indico.cern.ch/event/785928/>
- Both apertures of the MCBRDP1 without yoke at room temperature
26 Jun 2019 <https://indico.cern.ch/event/828981/>
- Three apertures without yoke and MCBRDP1b with yoke at room temperature
11 Dec 2019 <https://indico.cern.ch/event/867624/>
- Both apertures of MCBRDP2 at cryogenic and ambient temperature
16 Dec 2020 <https://indico.cern.ch/event/980963/>

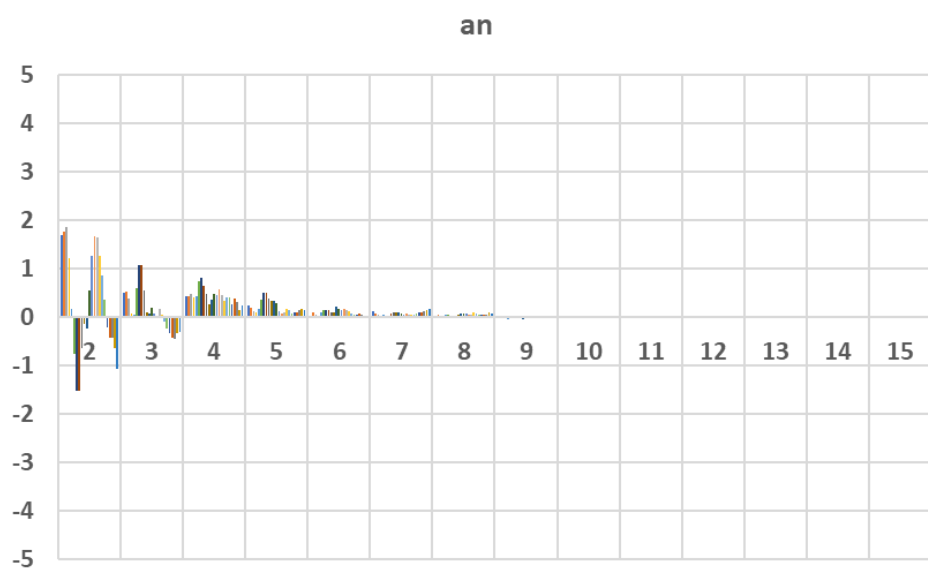
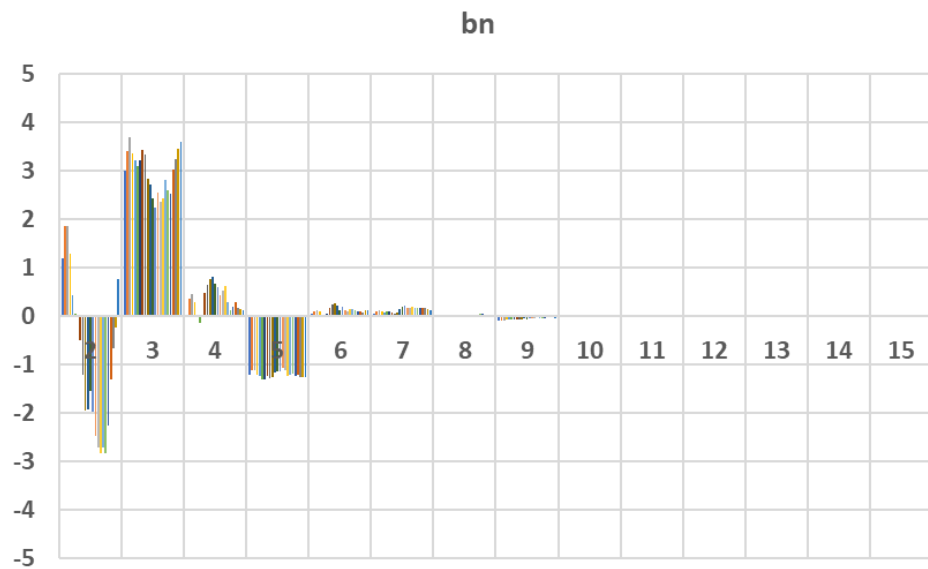
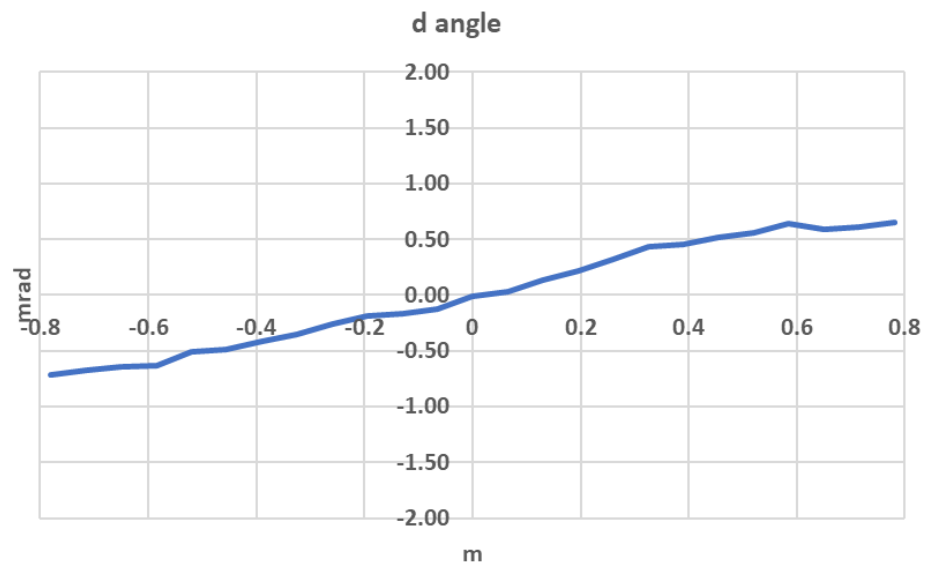
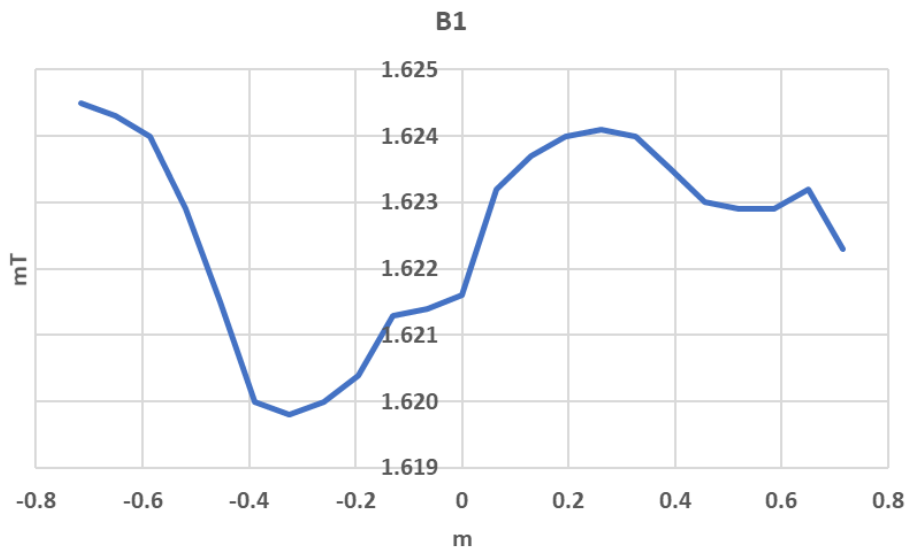
New measurement campaign



- Investigation on the source of the anomalous b3
- We have already measured MCBRDP1 with/without yoke
- When with yoke, hybrid keys were used

- MCBRDP3a
 - Assembly of the blue aperture with iron yoke (same as MCBRDP1)
 - Second aperture is not present (Al filler)
 - **Alignment keys made of a non-magnetic stainless steel**
 - Magnetic measurements at ambient temperature in 927

Results



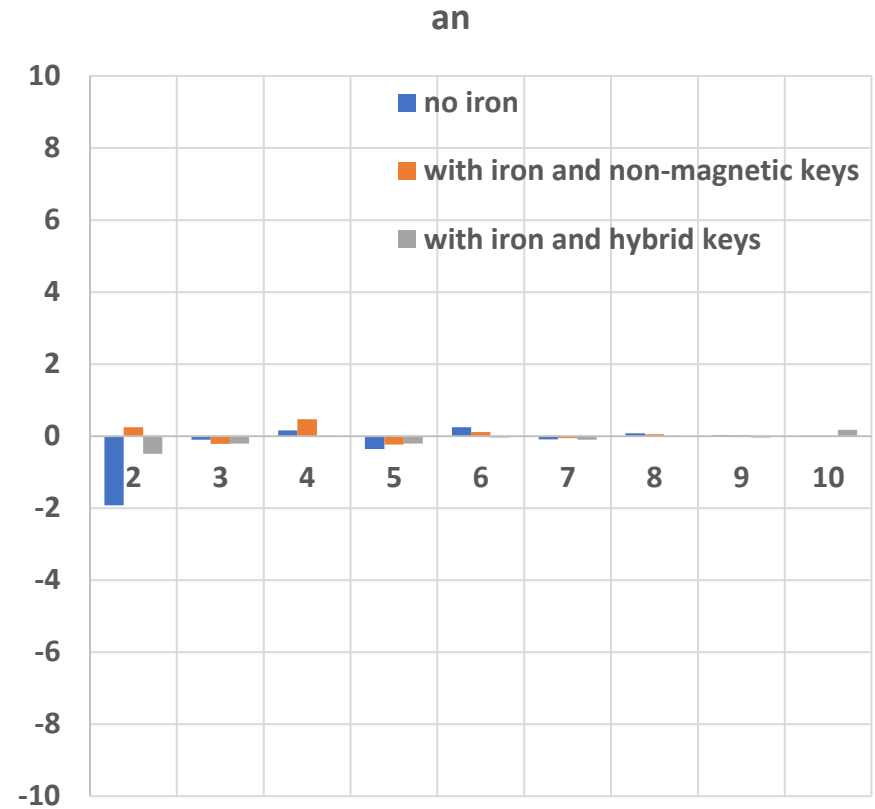
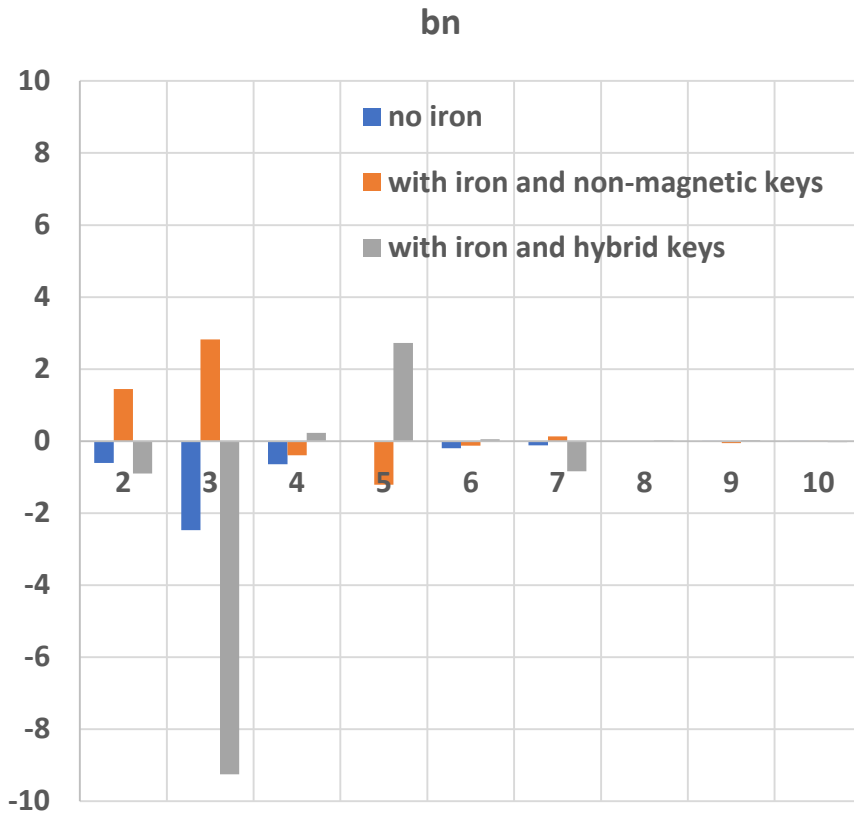
Comparison:

no iron / iron non-magnetic keys / iron hybrid keys

n	no iron		iron non mag keys		iron hybrid keys	
	bn	an	bn	an	bn	an
2	-0.61	-1.92	1.45	0.25	-0.90	-0.49
3	-2.47	-0.10	2.82	-0.22	-9.26	-0.21
4	-0.64	0.16	-0.39	0.47	0.22	0.00
5	-0.01	-0.36	-1.21	-0.23	2.73	-0.21
6	-0.20	0.24	-0.13	0.12	0.05	-0.04
7	-0.12	-0.09	0.13	-0.06	-0.84	-0.10
8	-0.01	0.07	-0.01	0.05	0.01	0.01
9	0.00	0.03	-0.06	0.02	0.02	-0.04
10	0.01	0.01	0.01	0.00	-0.03	0.17
11	0.01	0.01	0.01	0.00	0.14	-0.57
12	-0.01	0.00	0.00	0.00	-0.77	-0.14
13	0.00	0.00	0.00	0.00	1.69	-1.55
14	0.00	0.00	0.00	0.00	-1.21	0.47
15	0.00	0.00	0.00	0.00	0.27	0.44

Units of 10^{-4} at $R_{\text{ref}} = 35$ mm

Comparison with plots

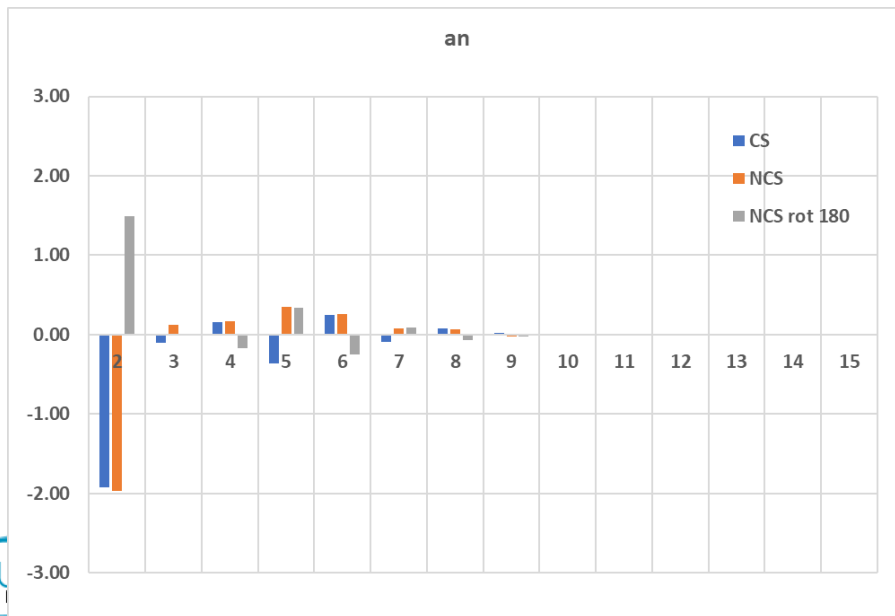
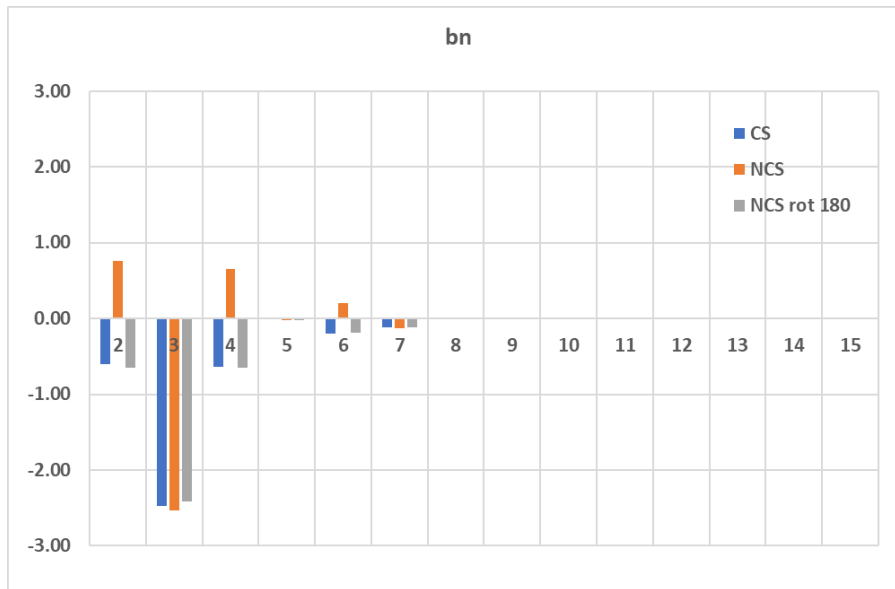


Units of 10^{-4} at $R_{\text{ref}} = 35$ mm

Conclusions

- Investigation on the source of the anomalous b3 (~-10 units)
 - Visible on
 - short model MCBRDS1 but not very clearly (2 apertures)
 - MCBRDP1 both at ambient and cryogenic temperature (3 apertures)
 - MCBRDP2 at cryogenic temperature (2 apertures), at ambient temperature some other effect was covering it
- Magnetic measurement at ambient temperature
 - Blue aperture without iron
 - Same aperture assembled in MCBRDP1 with iron and hybrid keys
 - Same aperture assembled in MCBRDP3a with iron and non-magnetic keys
- Without iron and without keys -2.5 units
- With iron and non-magnetic keys +2.8 units
- With iron and hybrid keys -9.3 units
- The hybrid keys produce the largest effect on b3

Annex: accuracy of magnetic measurements



- We measured the blue aperture without iron
 - From connection side
 - From non-conn side
 - From non-conn side but rotated by 180 degrees
- We found the expected inversions of sign
- The differences seen on the amplitude of multipoles is fraction of a unit (~ 0.1 unit)