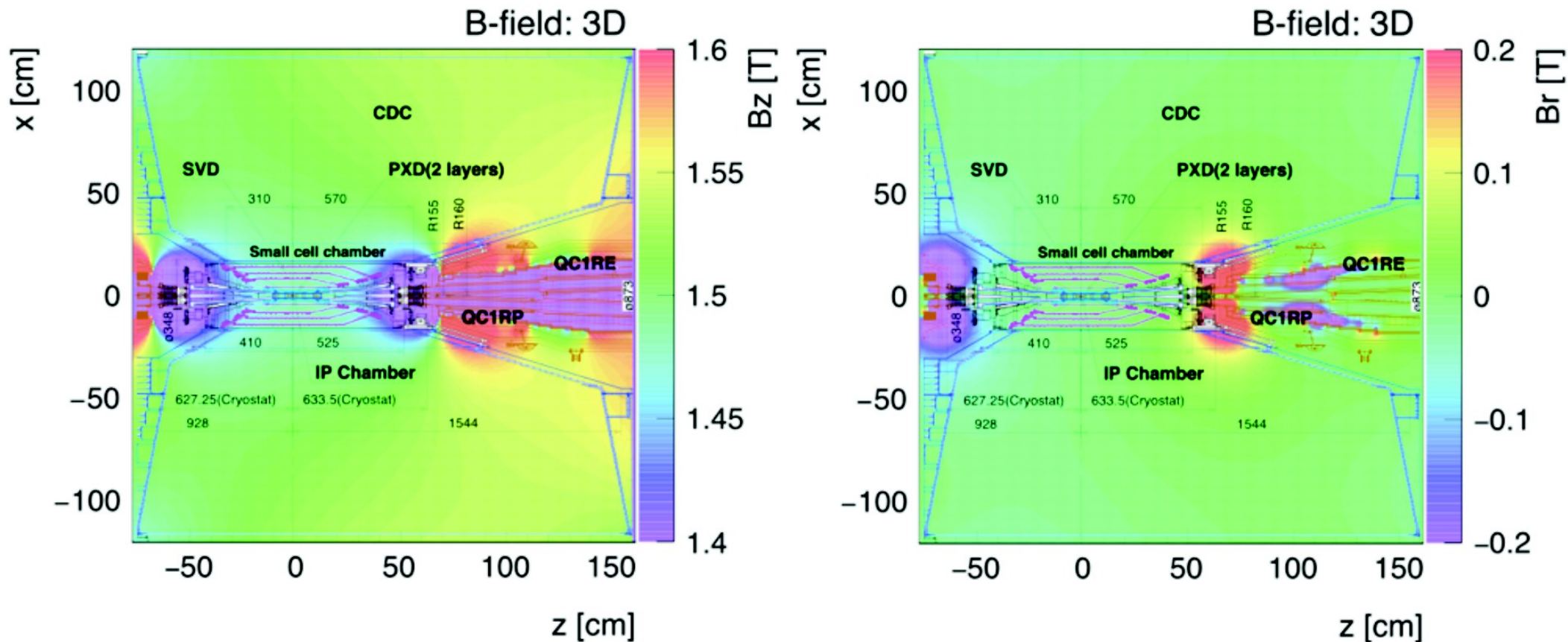


Magnetic field measurements and sign convention

S. Glazov, 7 June 2017, tracking meeting

B-Field with QCS magnets in the tracking volume



B_z variation $\sim 5-10\%$

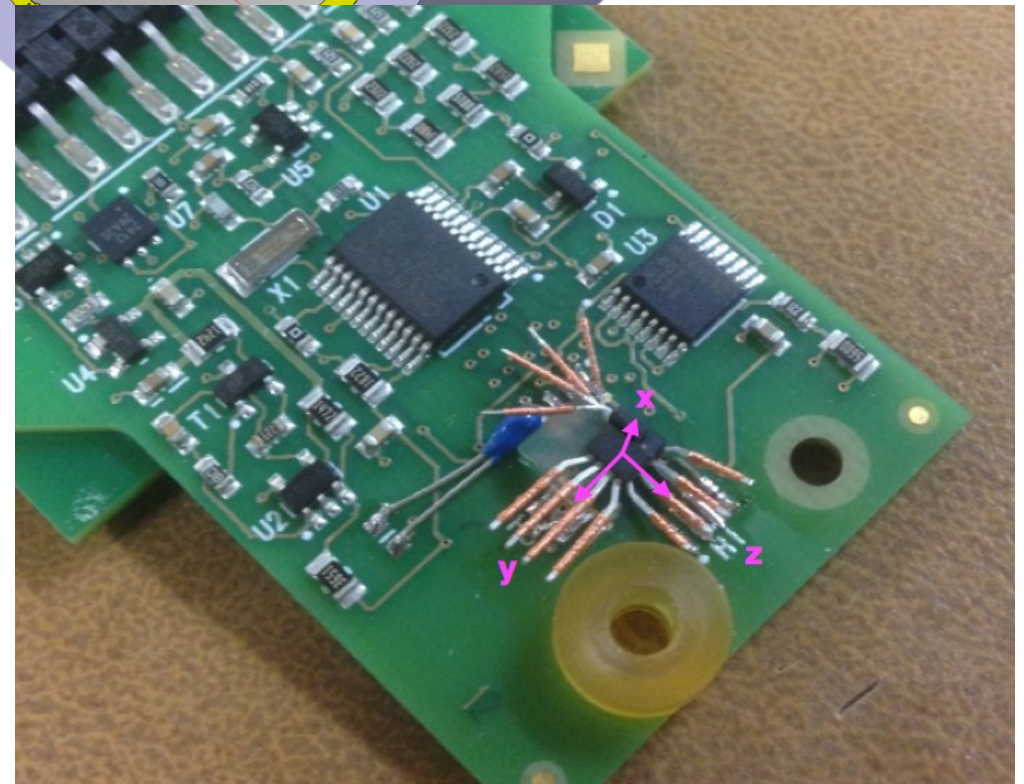
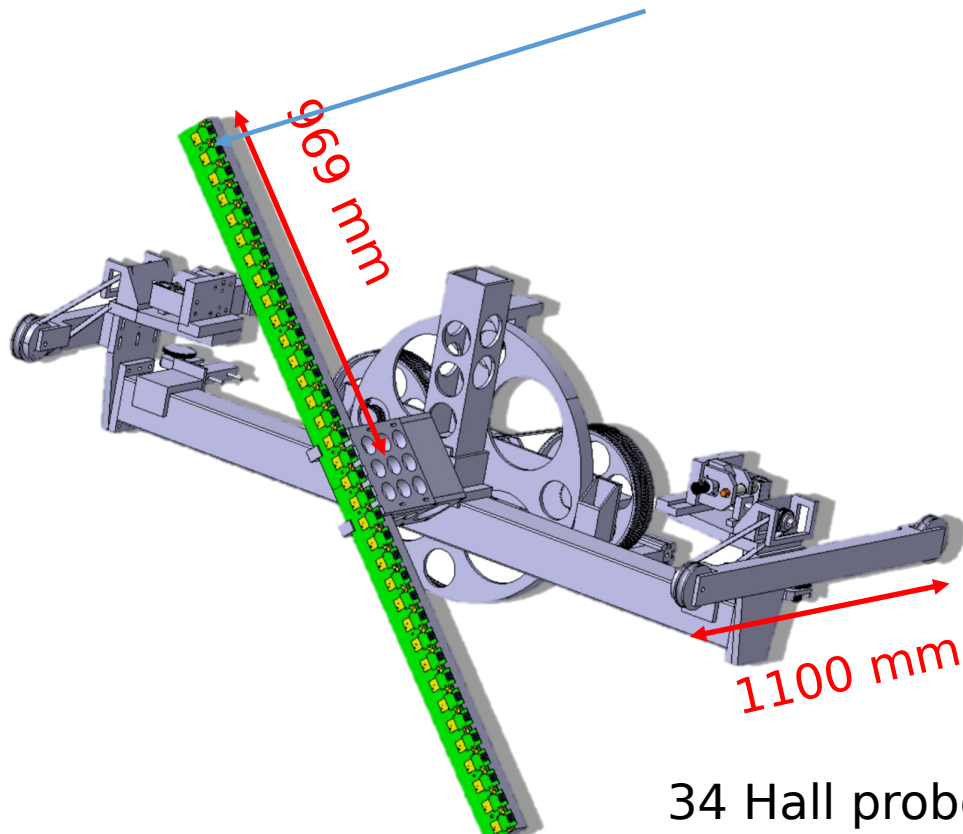
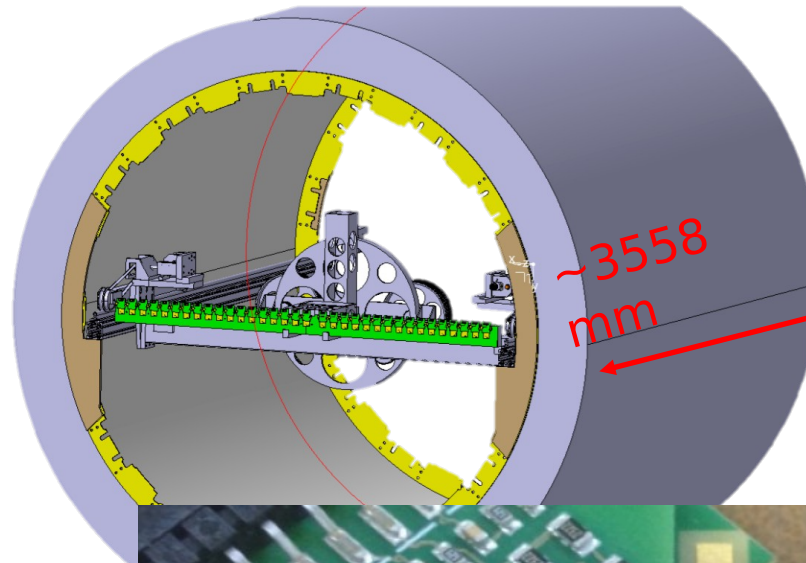
B_r non-negligible
in forward region

Y.Arimoto,, M. Takahashi: **Positive B_z** in simulation, same as for Belle

B-field mapper for CDC volume

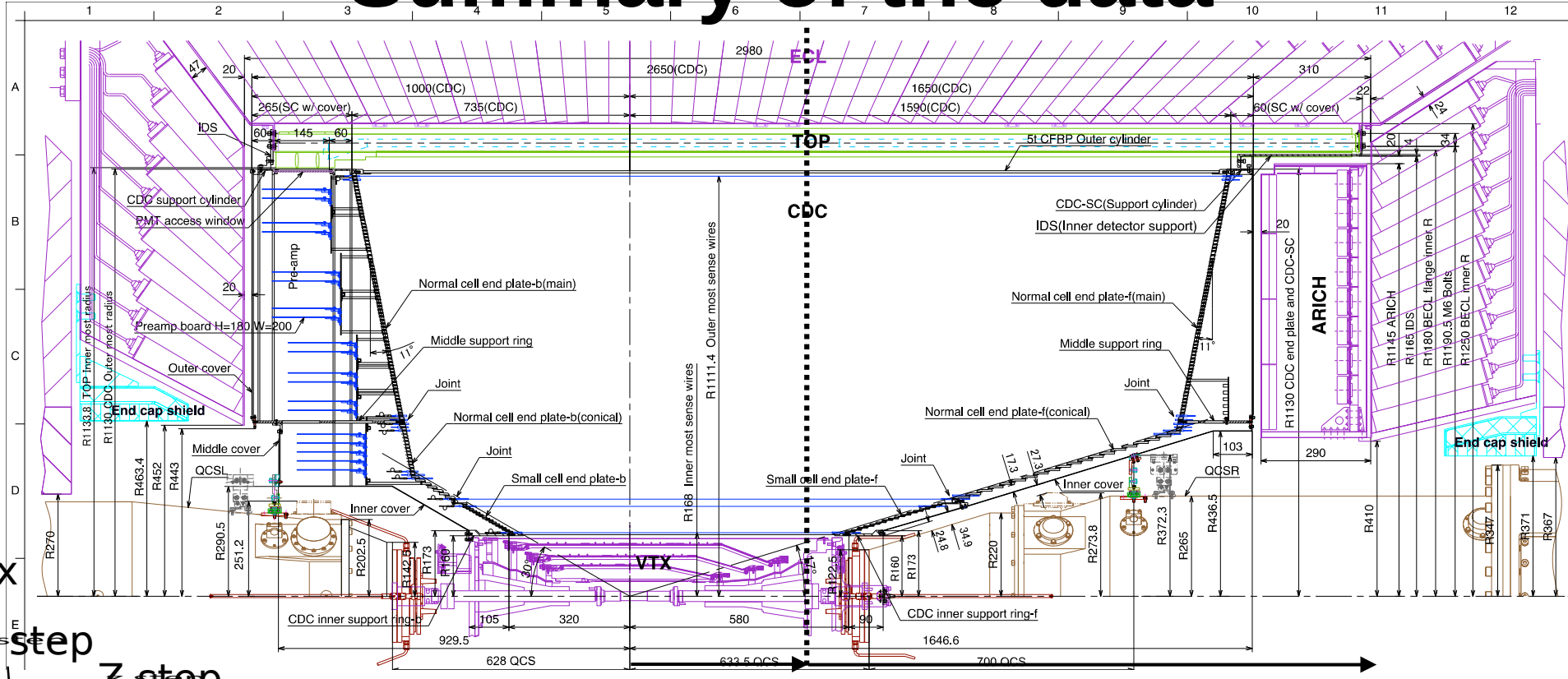
A. Guo

- Full 3D mapper
- New pneumatic engines
- Improved B-sensors
- Improved DAQ
- Carbon fiber arms



34 Hall probes, "Bx" facing towards the motor

Summary of the data



File index

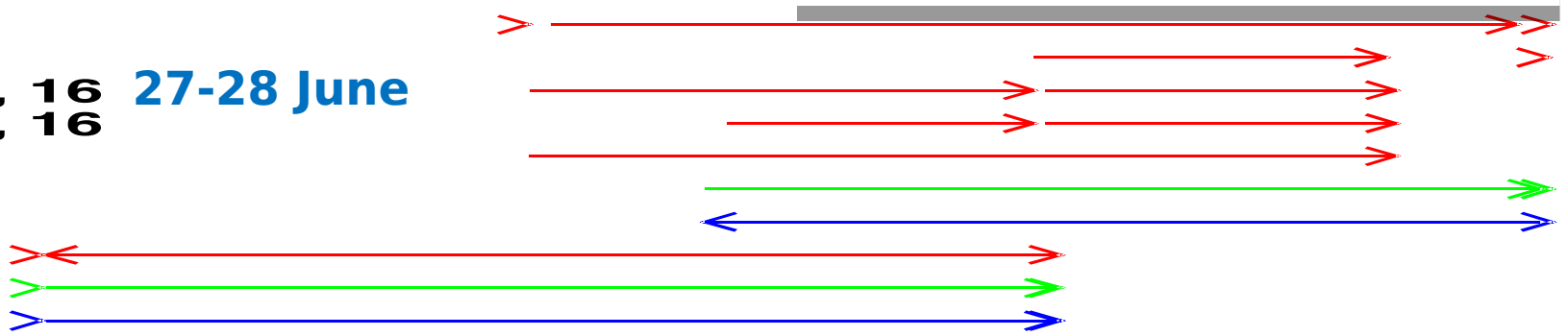
Phi step

Z step

10:	12:	22
11:	48:	16
12:	48:	46, 16
13:	48:	28, 16
14:	48:	79
15:	48:	38
16:	48:	38
17:	48:	92
18:	48:	46
19:	48:	46
20:	180:	8
21:	48:	91
22:	96:	40
23:	96:	40
24:	60:	67

27-28 June

Sensor "Bx" pointing to **negative Z**



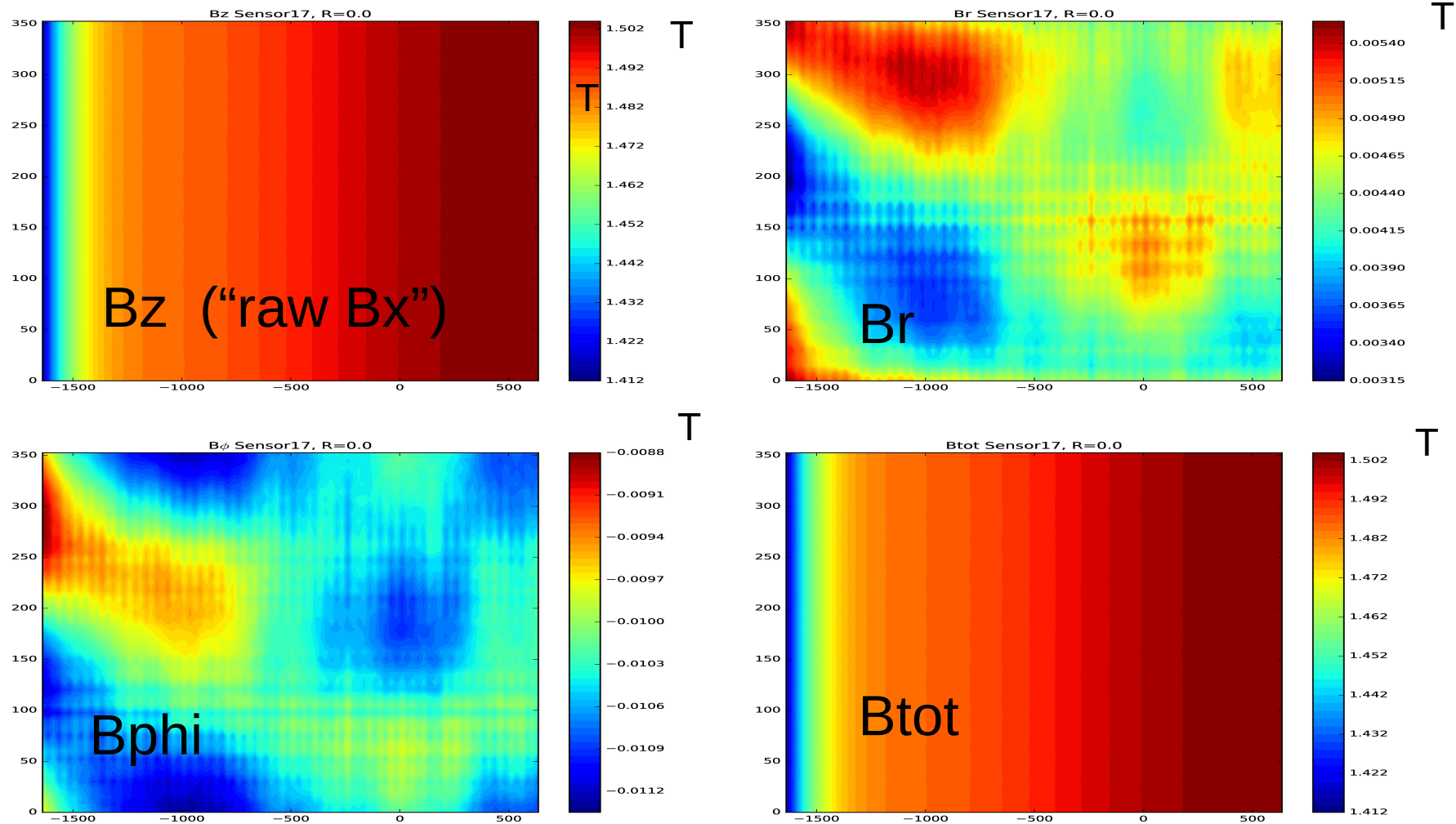
Sensor "Bx" pointing to **positive Z**

1-3 July

1.50 T
1.25 T
1.00 T

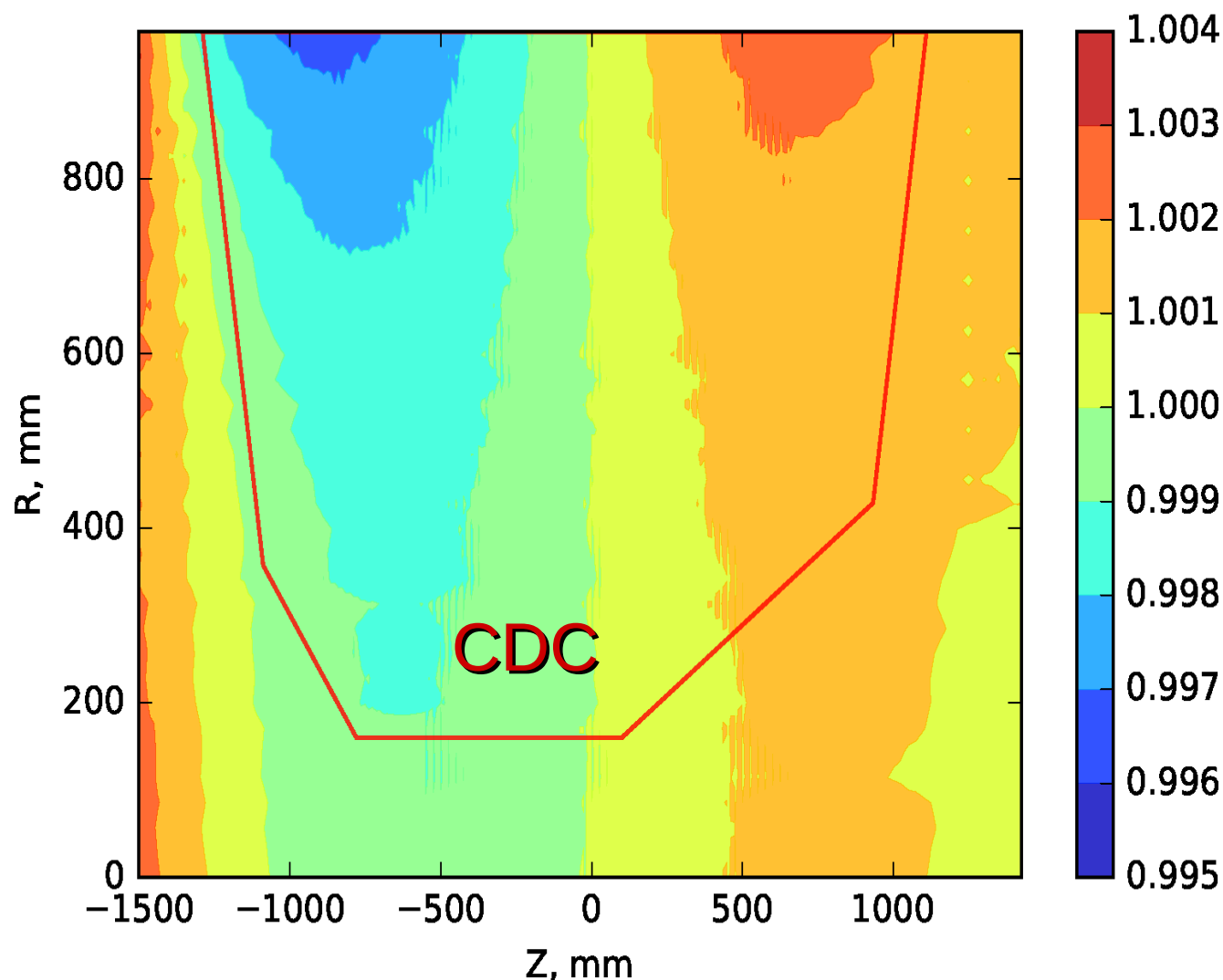


Raw B-field data



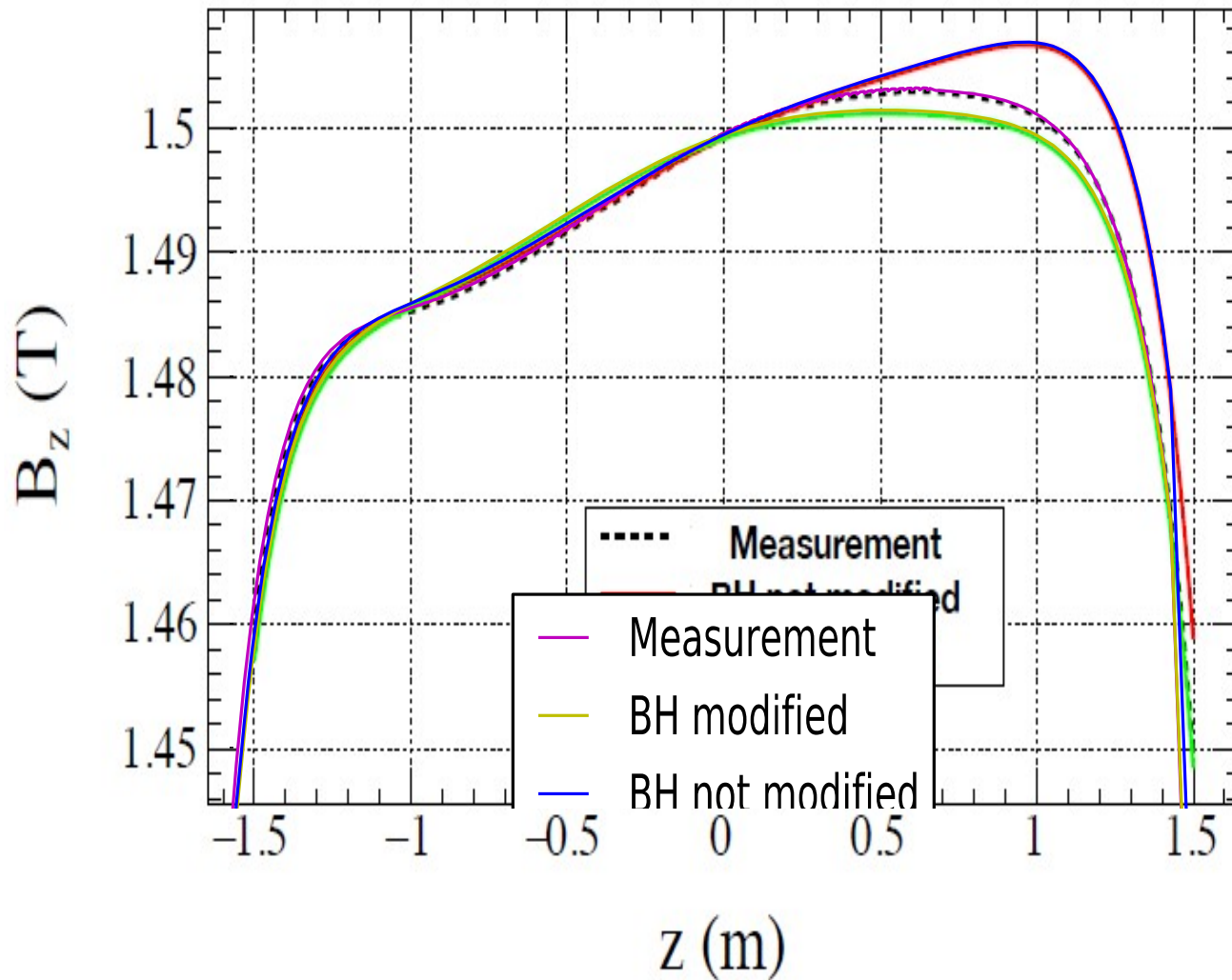
Data from the first runs (#13), "Bx" pointing to negative Z, positive reading = **negative Bz**!
Significant variations of Br and Bphi components of the field due to misalignment (rotation) of the detector

Comparison with simulation for B_z



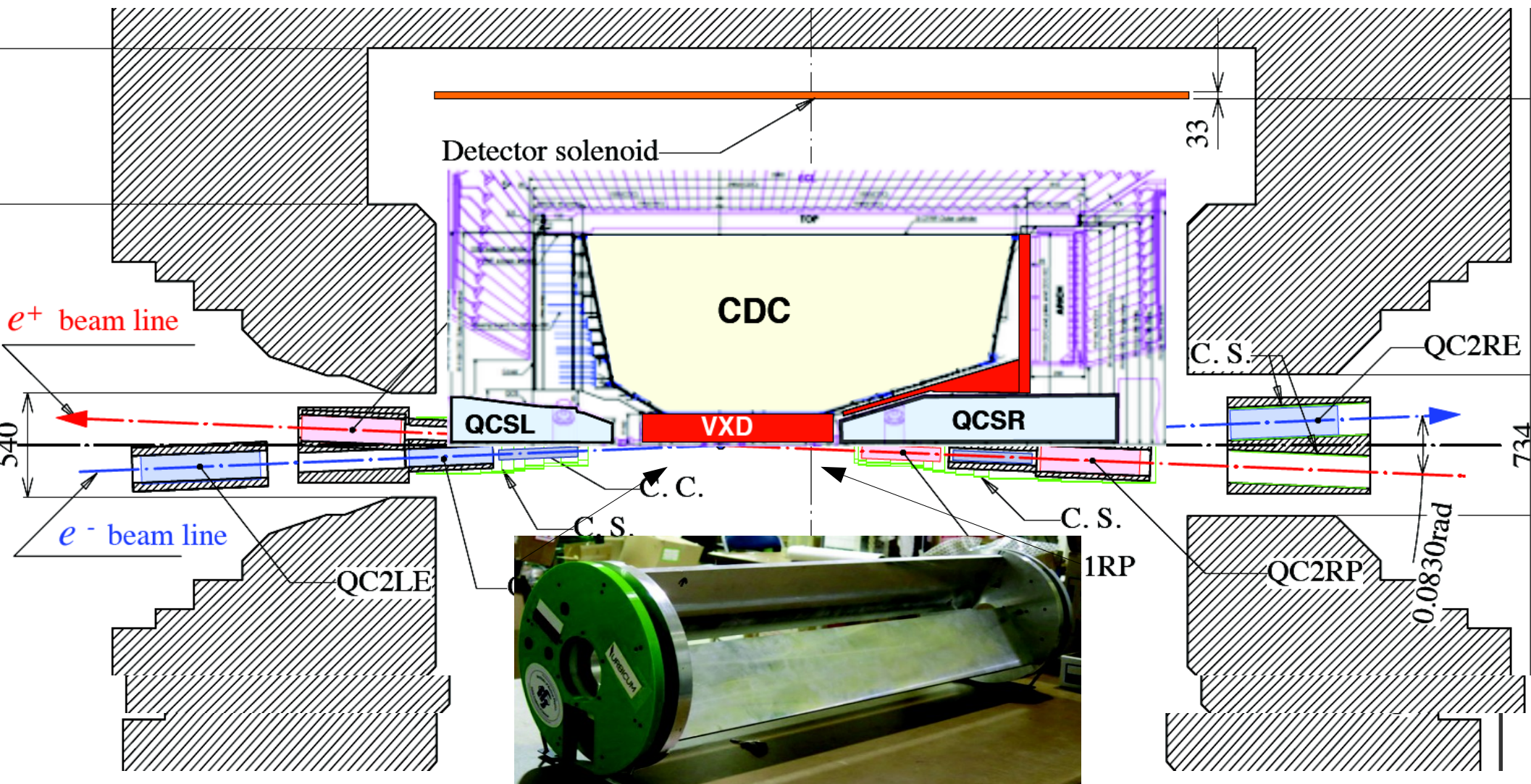
- Sign **flipped** for the data
- Overall agreement between data and wrong sign MC is not bad, suggesting polarity flip may be rather small effect.
- Can compare to MC with "correct" polarity

Comparison with QCS group measurement



The measurement performed on B-field axis in November 2015 and also to old version of magnetic field simulation (“BH not modified”) also had sign flipped

Planned measurement in 2017



Sensors installed in VXD, QCSL,R, and CDC backplate areas. A run with only Belle solenoid magnet on should allow to compare vs the 2016 measurement

Summary

Belle-II solenoid magnetic field direction was opposite vs Belle-I. The flip occurred probably during the change of the magnet power supply.

Simulation uses Belle-I field orientation (and should stay like that)

Measurements from 2015-2016 failed to detect the flip due to uncertainties in the sensor orientation

QCS magnet assembly assumed orientation as in the simulation (= Belle-I), thus the Bz-field orientation had to be flipped.

This invalidates partially previous measurements of the field, however given comparisons with the simulation for the wrong orientation the effect is probably small. We can also simulate both polarities to check expected difference.

Comparison of the magnetic field data to be collected this year with the last year run should also allow to cross-calibrate the old result.