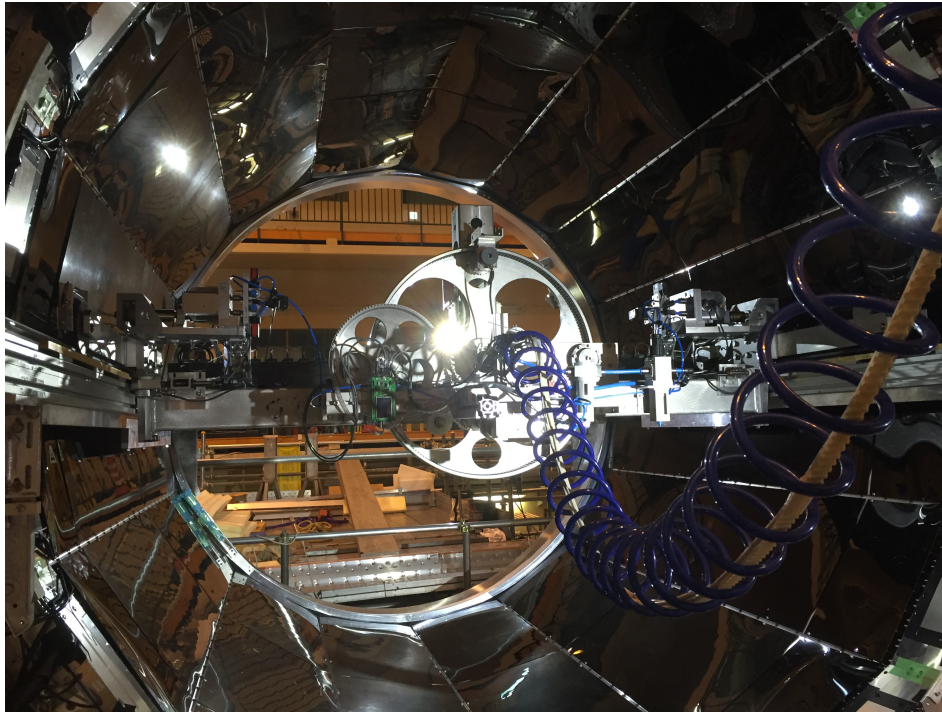


Measurement of B field for BelleII solenoid



Aiqiang Guo
from BelleII group
DESY and IHEP

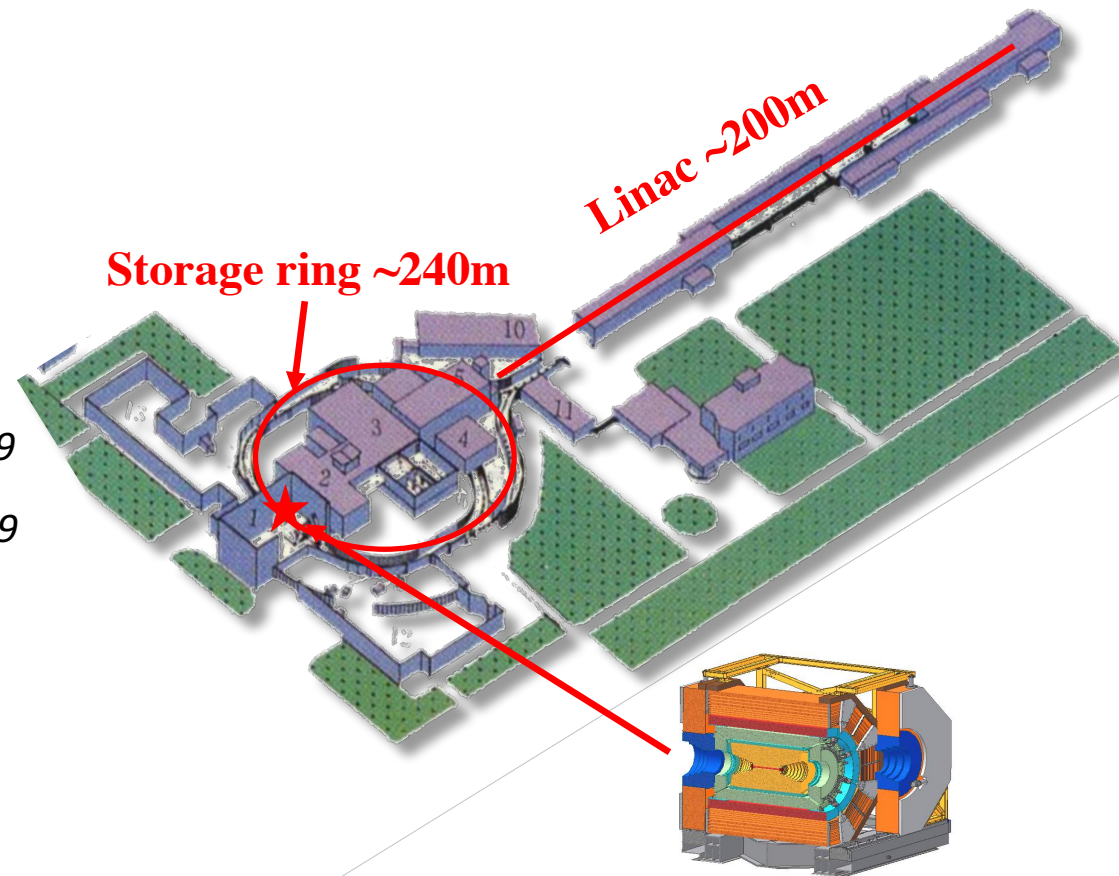
Work experience before 2016

Physics analysis for the BESIII experiment

- Electron-positron collider in Beijing
- Designed luminosity: $10^{33} \text{ cm}^{-2}\text{s}^{-1}$ @ 3.77 GeV
- $\sqrt{s} = 2 \sim 4.6 \text{ GeV}$ since 2009

My topics:

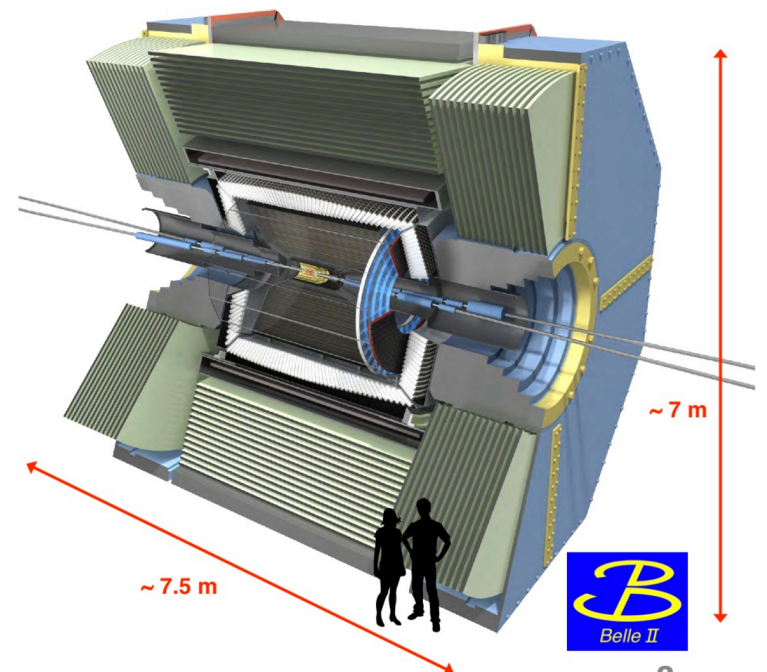
- Charmonium spectroscopy
- Exotic hadron
 1. $\psi(2S) \rightarrow \pi^0 h_c$ PRD 86, 092009
 2. $e^+e^- \rightarrow \eta' J/\psi$ PRD 94, 032009
 3. $e^+e^- \rightarrow \eta h_c$
 4. $Z_c \rightarrow \rho \eta_c$



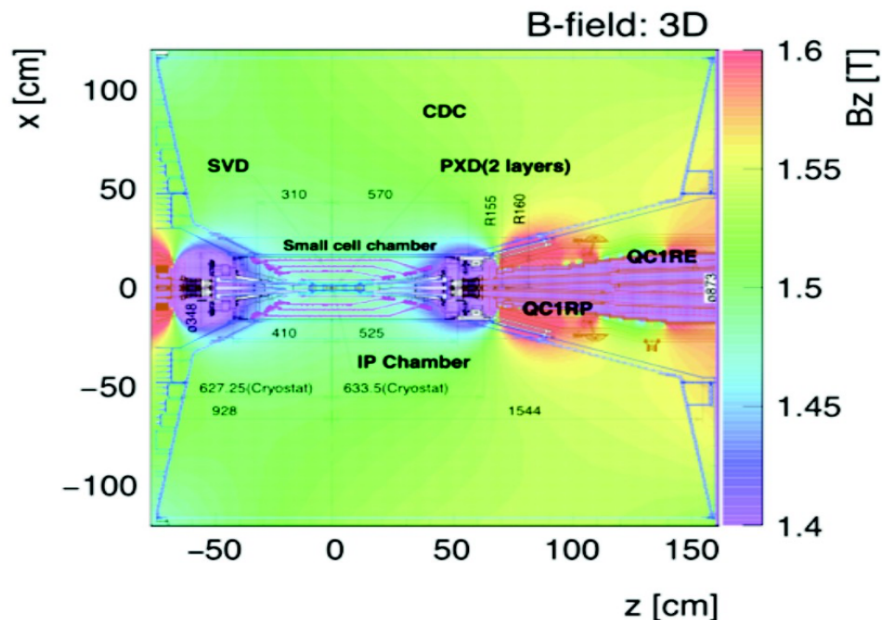
Move on to BelleII

ONACPR fellow

- The next generation B factory with 50 times larger luminosity than its predecessor.
- Under commissioning, data taking is scheduled in 2019.
- My project: B field measurement

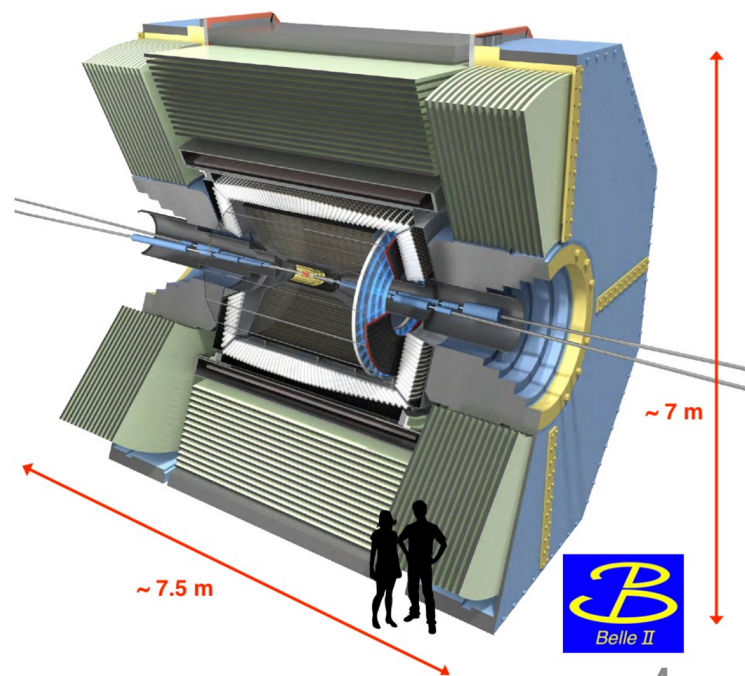


Move on to BelleII



- Achieve accuracy of final B-field map better than 0.1%
- First step: measure B-field in full tracking volume before installation of final focus magnets
- Constraint: only very short time window available

- The next generation B factory with 50 times larger luminosity than its predecessor.
- Under commissioning, data taking is scheduled in 2019.
- My project: B field measurement



Mapping machine

Mapper designed and produced by CERN and made of non-magnetic materials

Carbon fiber arms

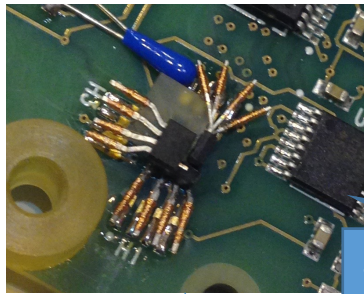
969 mm

1100 mm

2152 mm

pneumatic engines

Mapping machine



34 Hall probes.
 B_z B_r B_ϕ measured
simultaneously
Fully calibrated

Mapper designed and
produced by CERN and made
of non-magnetic materials

Carbon fiber arms

969 mm

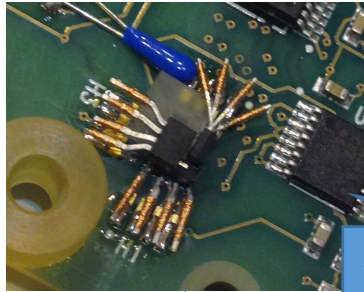
1100 mm

2152 mm

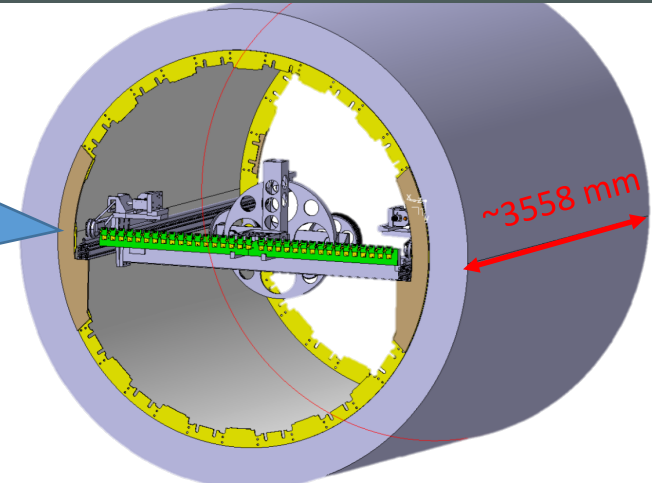
pneumatic engines

Mapping machine

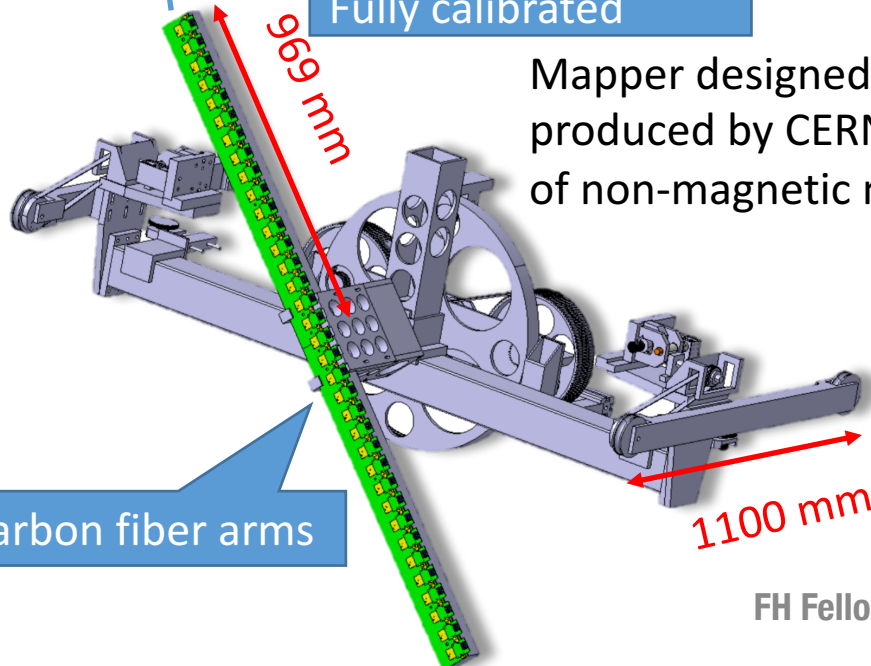
The support rails are installed inside the CDC. Reverse the mapper during measurement to reach all volume



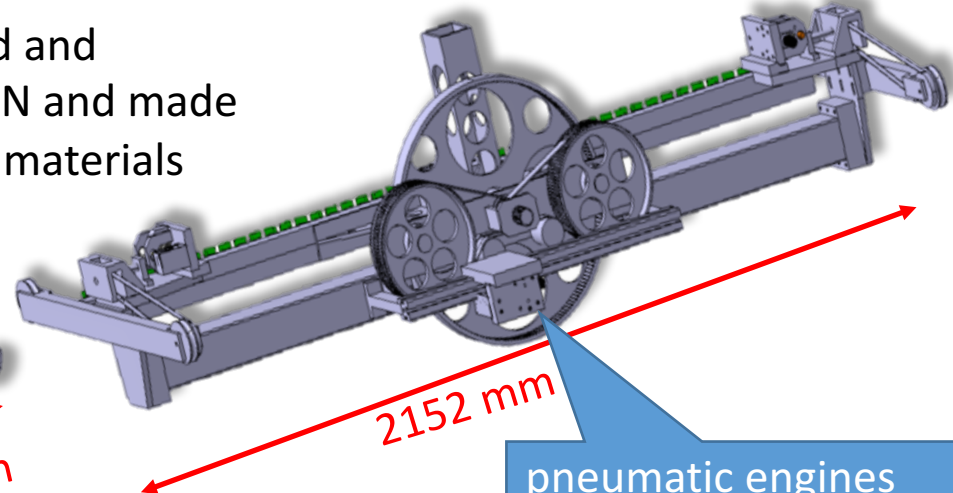
34 Hall probes.
 B_z B_r B_ϕ measured simultaneously
Fully calibrated



Mapper designed and produced by CERN and made of non-magnetic materials



Carbon fiber arms



pneumatic engines

Measurement procedure

1.4M points totally

-1780 mm

+1780 mm

969 mm

File index

ϕ 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

1-3 July

1.50 T

1.25 T

1.00 T

FH Fellow Meeting

Measurement procedure

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27-28 June

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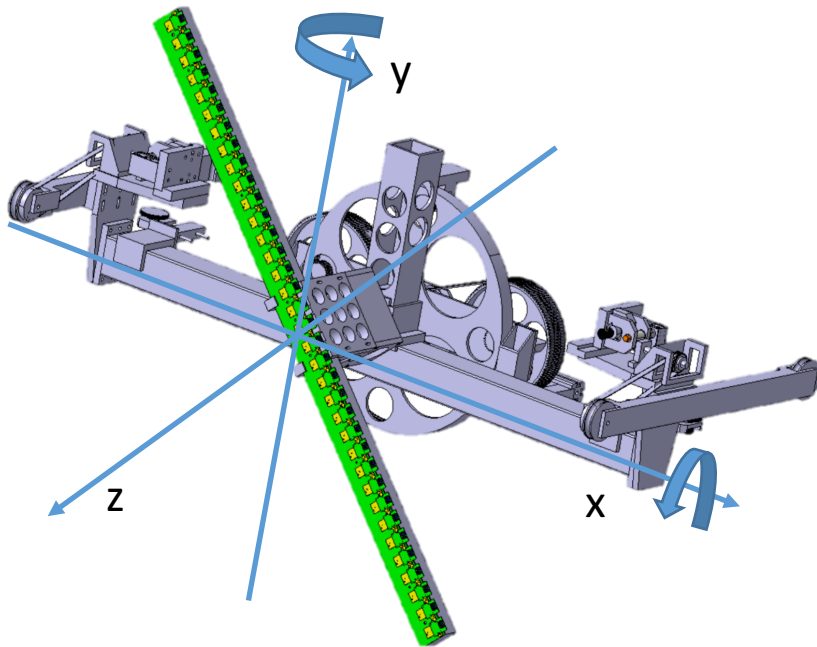
1.25 T

1.00 T

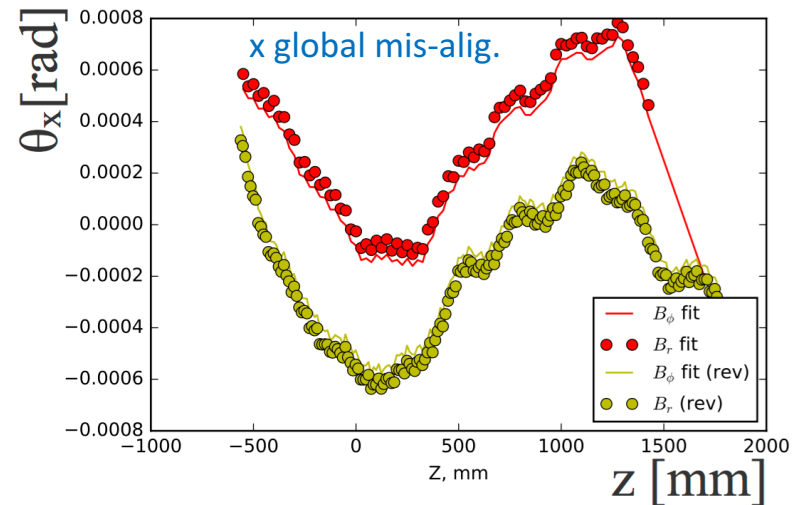
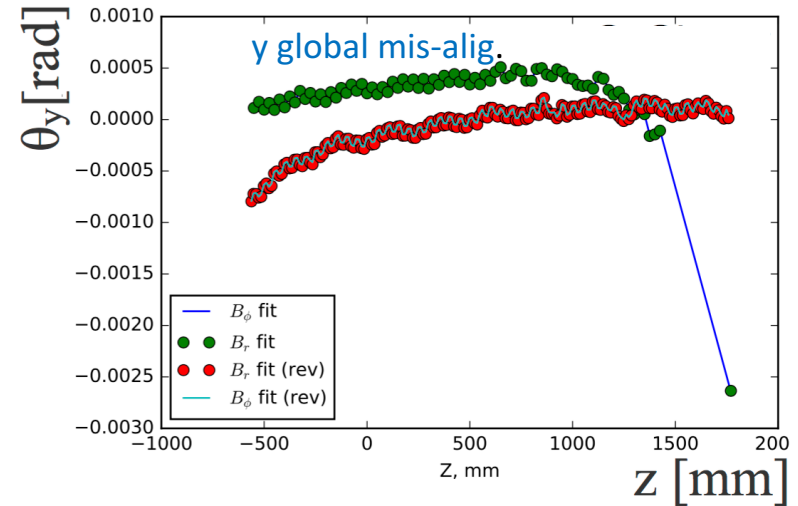
FH Fellow Meeting

Data analysis

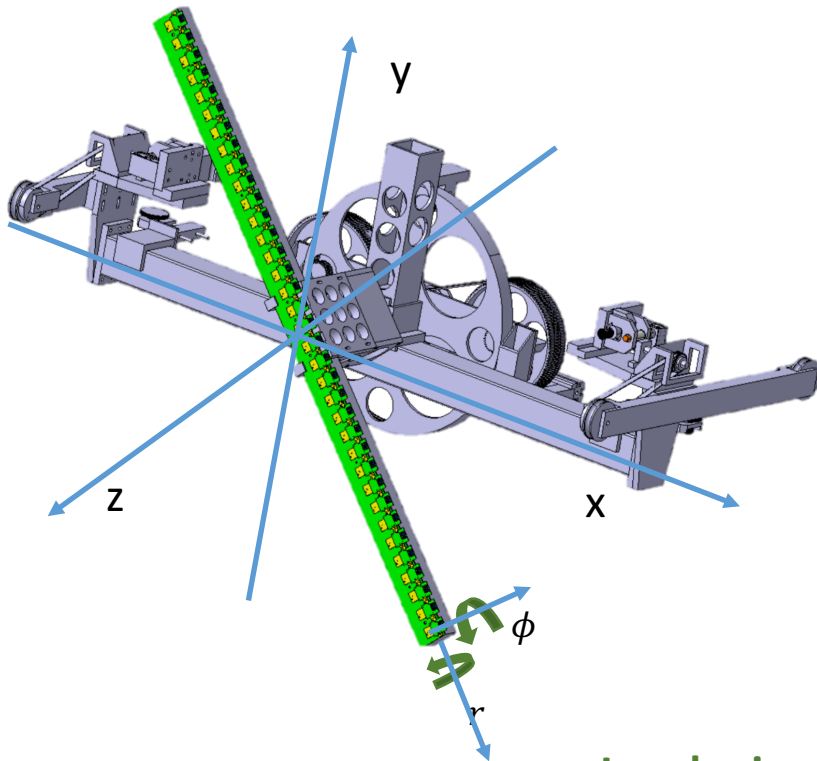
Global mis-alignment is due to imperfect movement of mapper



Determined by the B_ϕ and B_r measured by the probes in the center of arm

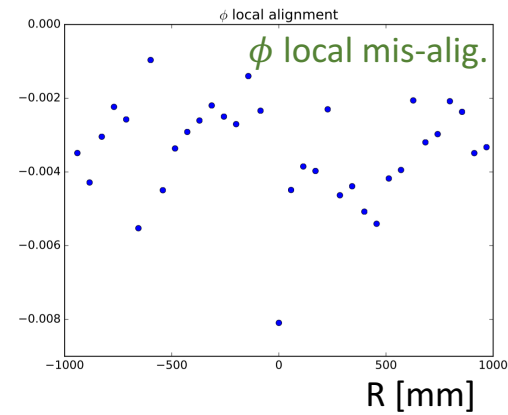
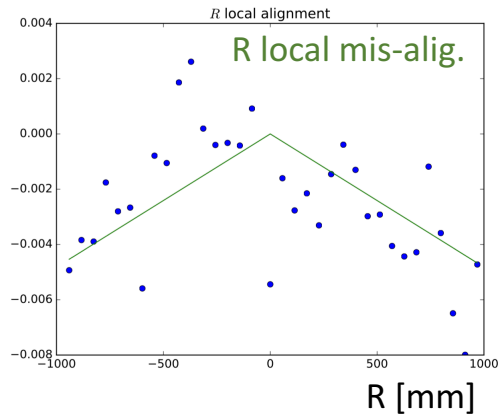


Data analysis



Determined by the average field over ϕ :

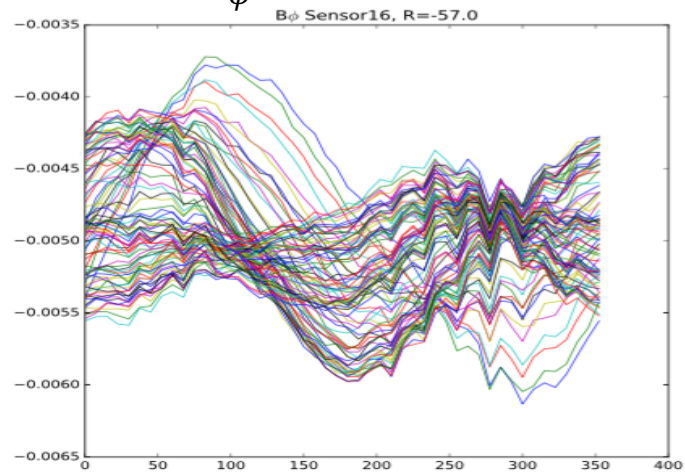
$$\bar{B}_{measured} = \bar{B}_{physics} + \bar{B}_{local} + \bar{B}_{global}$$



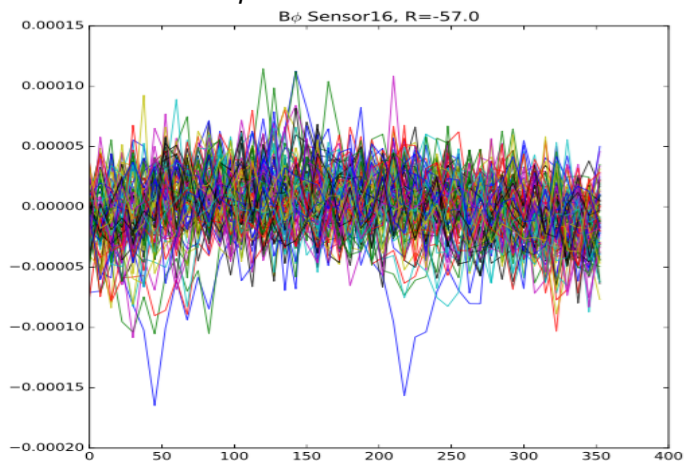
Local mis-alignment is due to imperfect positioning of sensors on the arm

Preliminary results

B_ϕ before correction

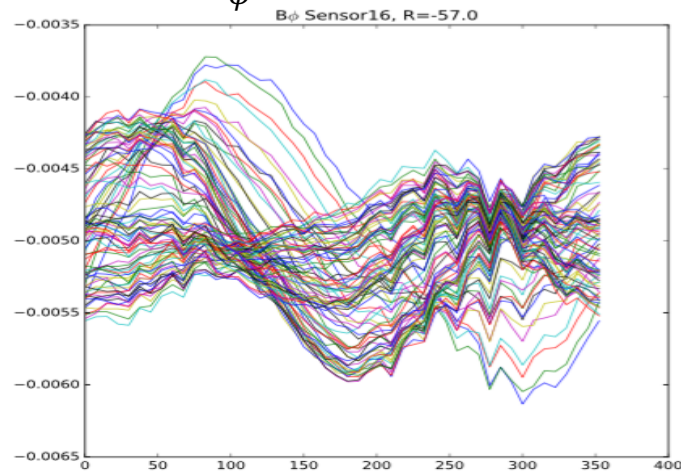


B_ϕ after correction

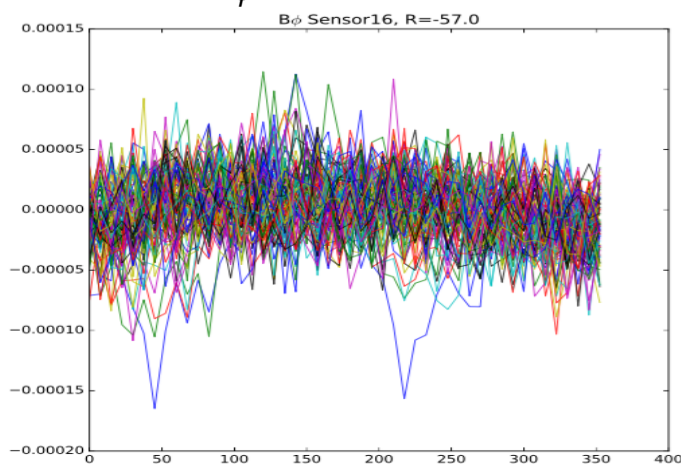


Preliminary results

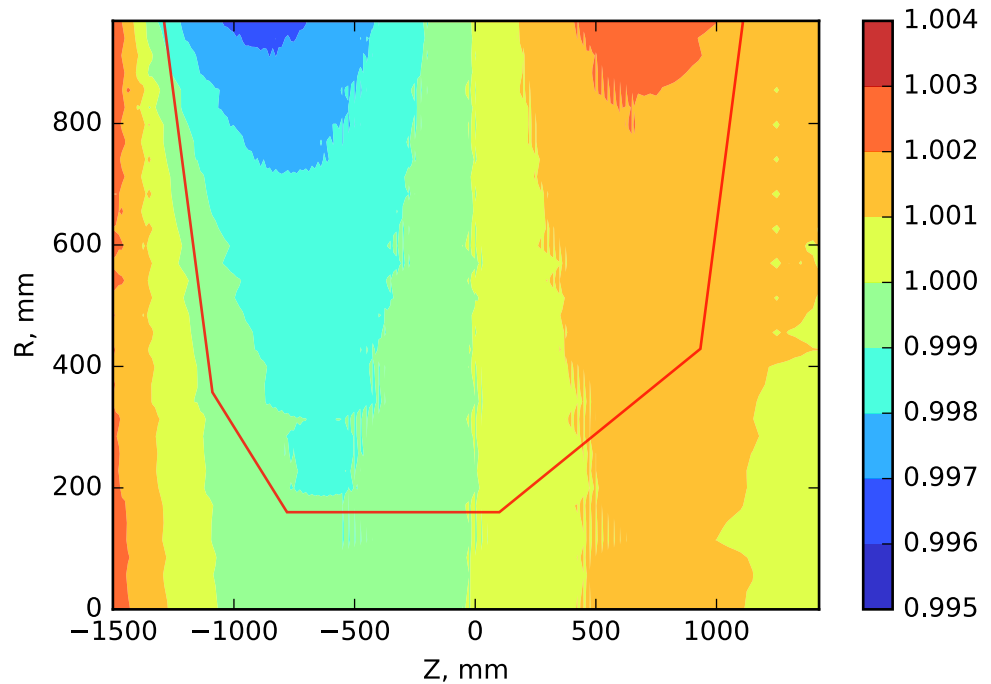
B_ϕ before correction



B_ϕ after correction



Ratio Data over Simulation

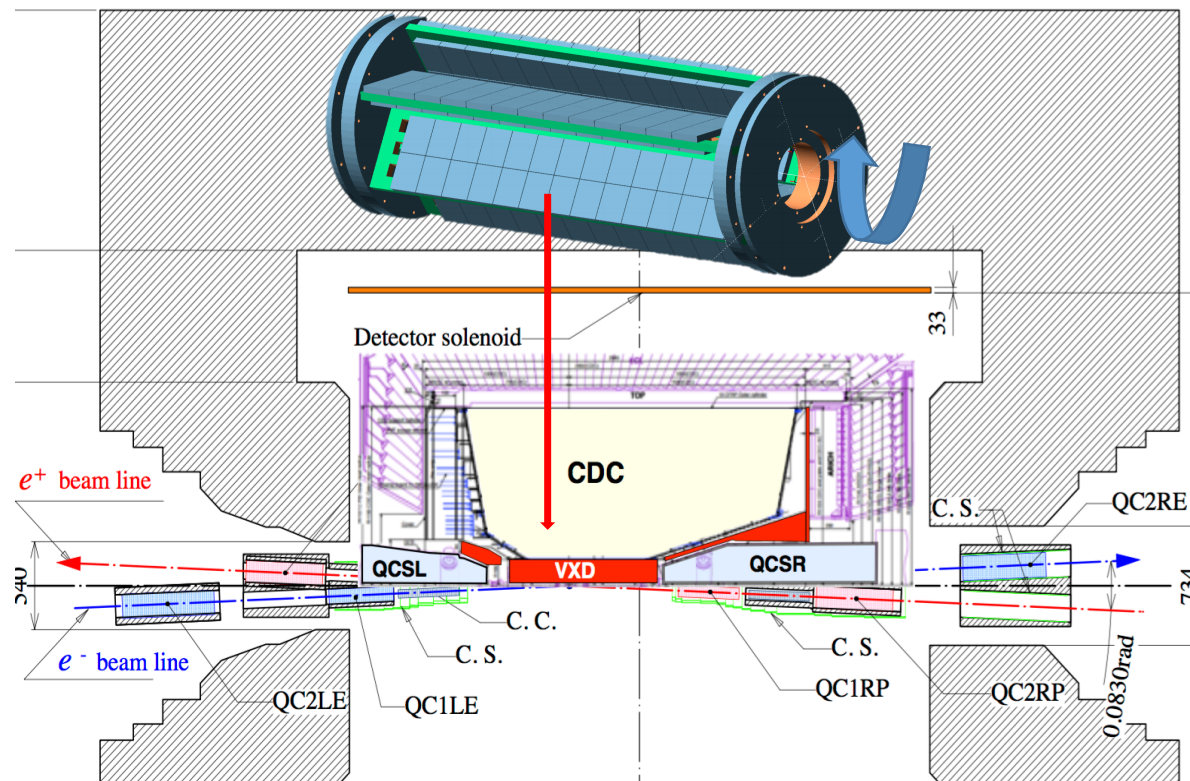


Agreement between data and simulation is OK in most of tracking volume, except in some small regions at large r and z

Outlook

Another B field measurement campaign will be performed in 2017.

- New designed facility
- With CDC and QCS installed
- Measure the B field in the region where VXD located
- The gap between QCS and CDC also will be investigated.
- The final B field will be calculated based on all the measurements.



Summary

- B field measurement in CDC volume is completed successfully with excellent data quality.
- The result show reasonable agreement with the simulation.
- The next measurement in the VXD volume with QCS magnets is on schedule, which is planned in early April 2017.
- This measurement provides important information for tuning of Opera MC modeling to match the data in the tracking volume.

Thank you!