# Status of Partial Return Yoke

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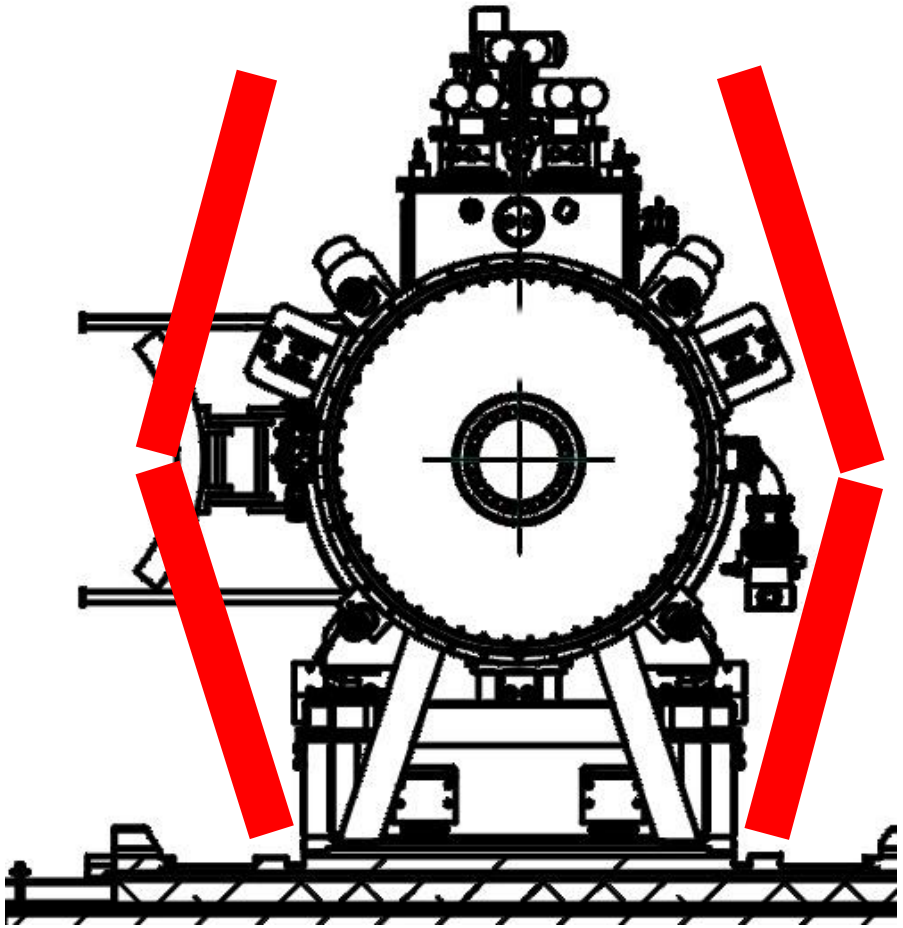
# Overview

- Introduction and Concept
- Performance
- Engineering
- Timeline

# Partial Return Yoke

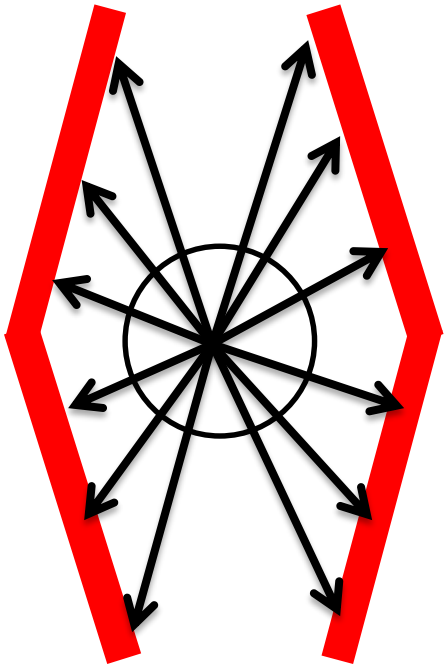
- MICE hall: solenoids cause large stray field
- Aim of PRY:
  Reduce stray field in hall to tolerable level
- Shielding plates
  - wall thickness 10 cm
  - weight: 55t
- Performance
  - Reduces stray field outside of shield to 5-10 Gauss



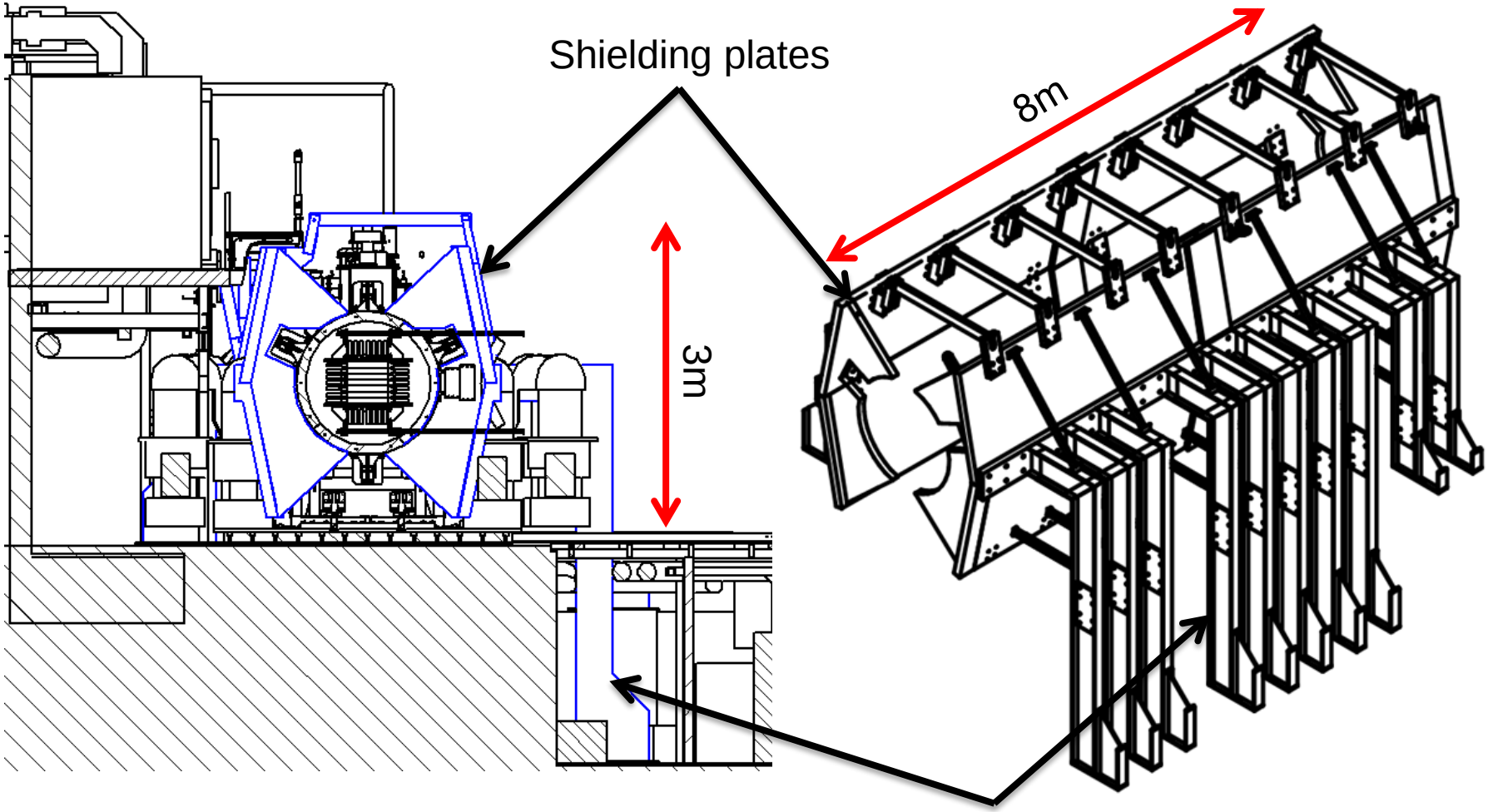
(Note: not to scale)

H Witte. Step IV & VI: Local Flux Return. MICE CM 34, October 2012.

# Principle



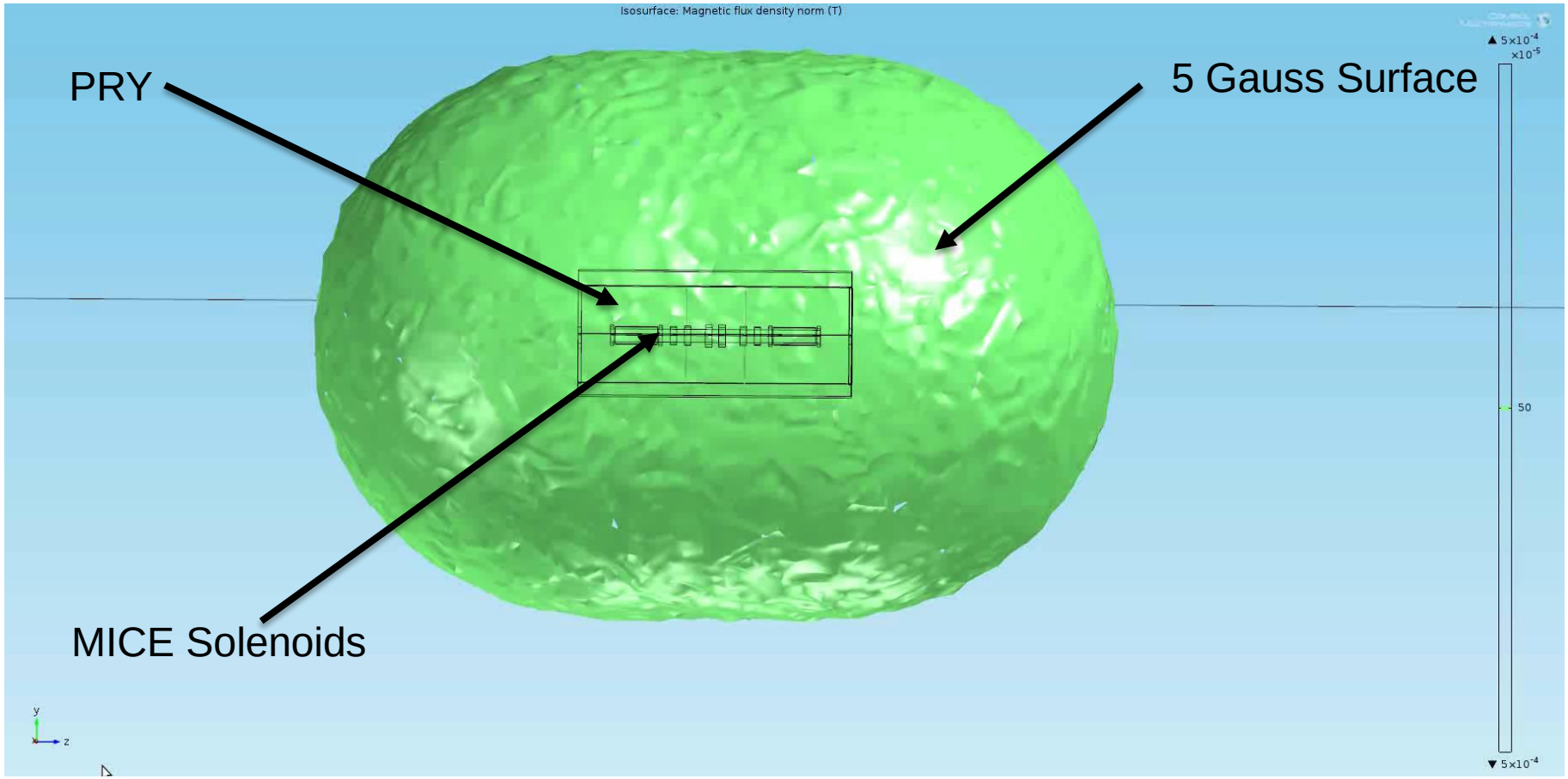
# Partial Return Yoke




Courtesy of Jason Tarrant / Steve Plate

# Performance

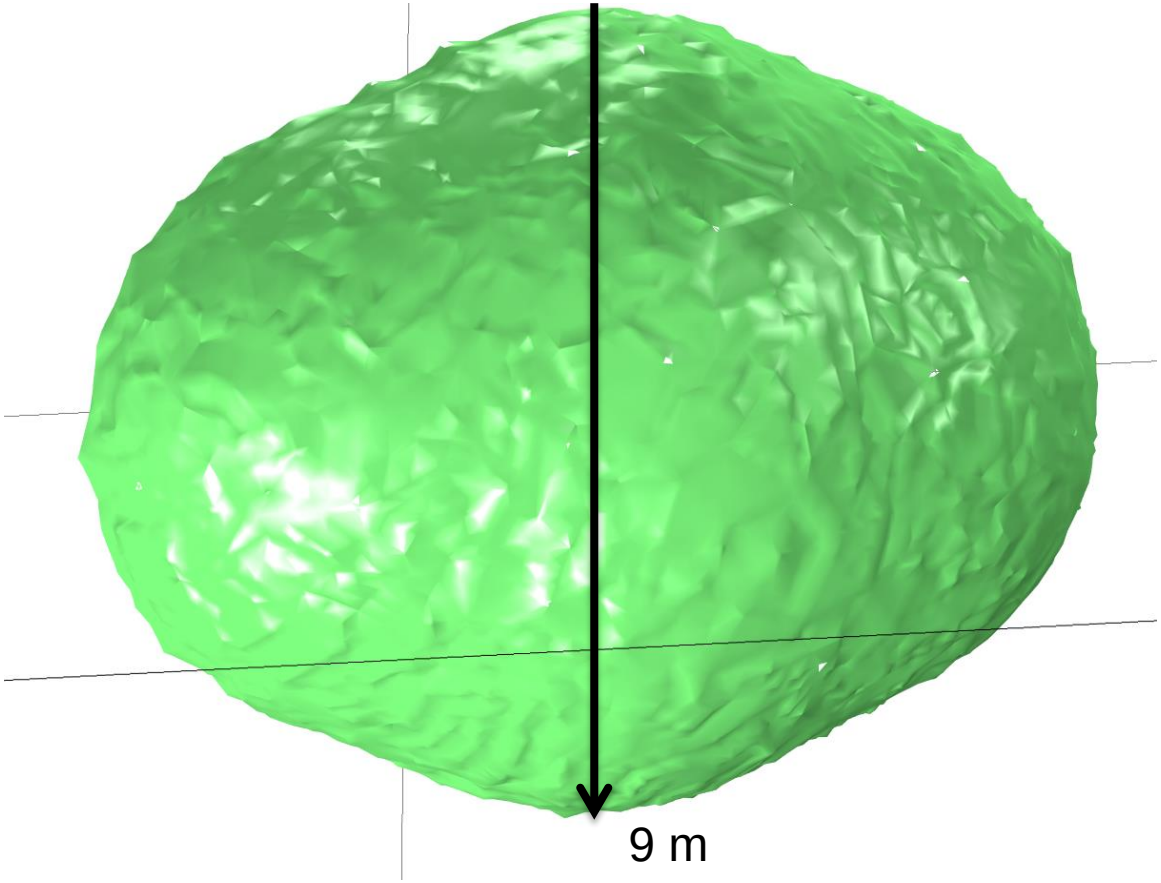
# 5 Gauss Surface



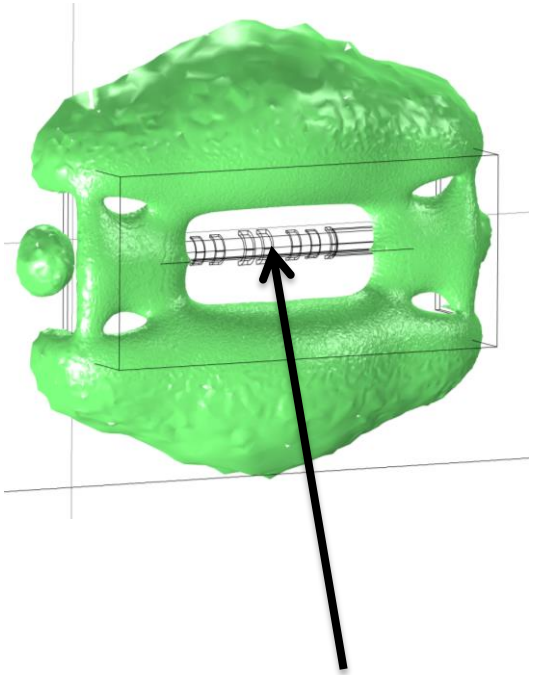

No iron

# Iso-Surface 0.5 mT

No Shield

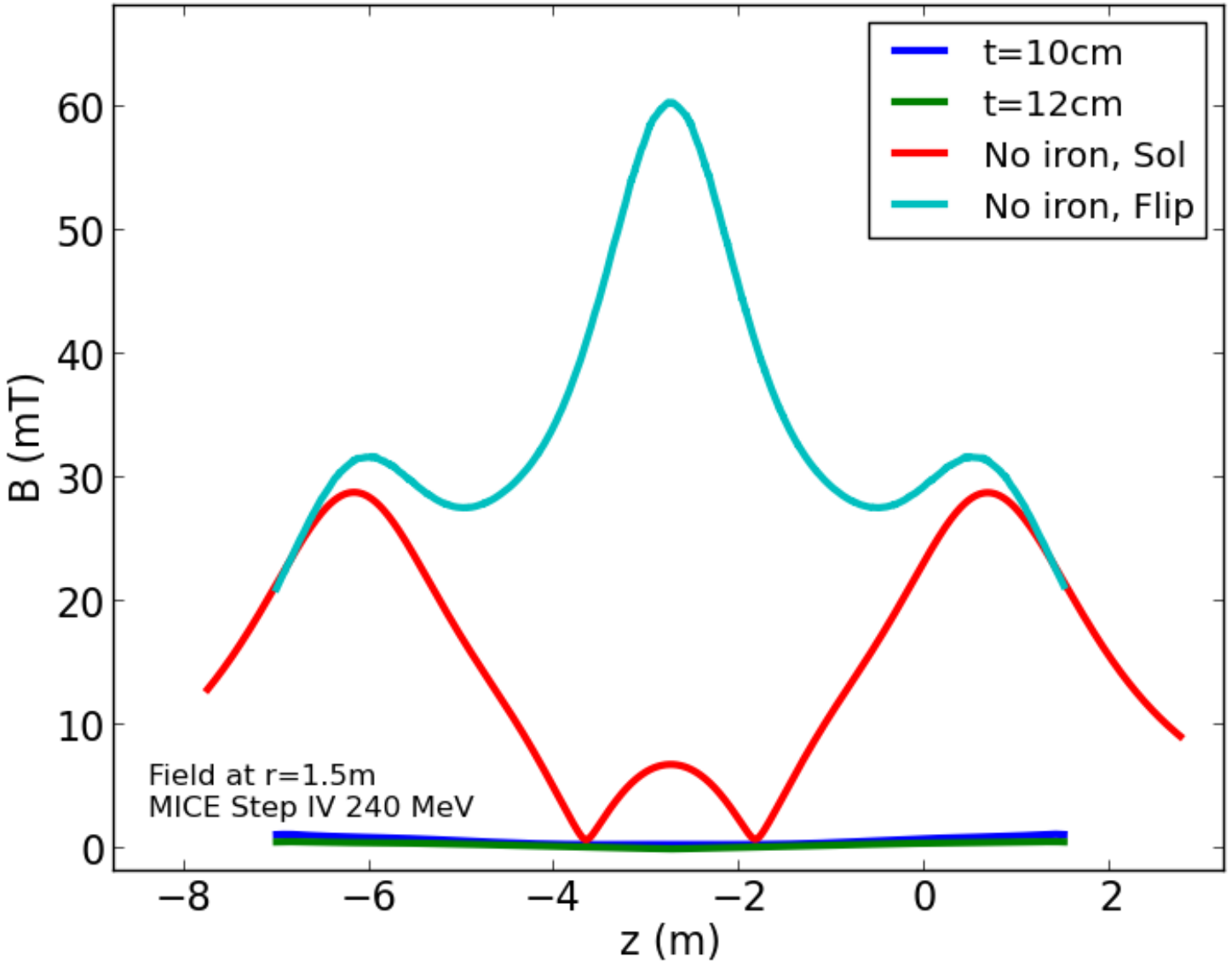



12 cm Shield

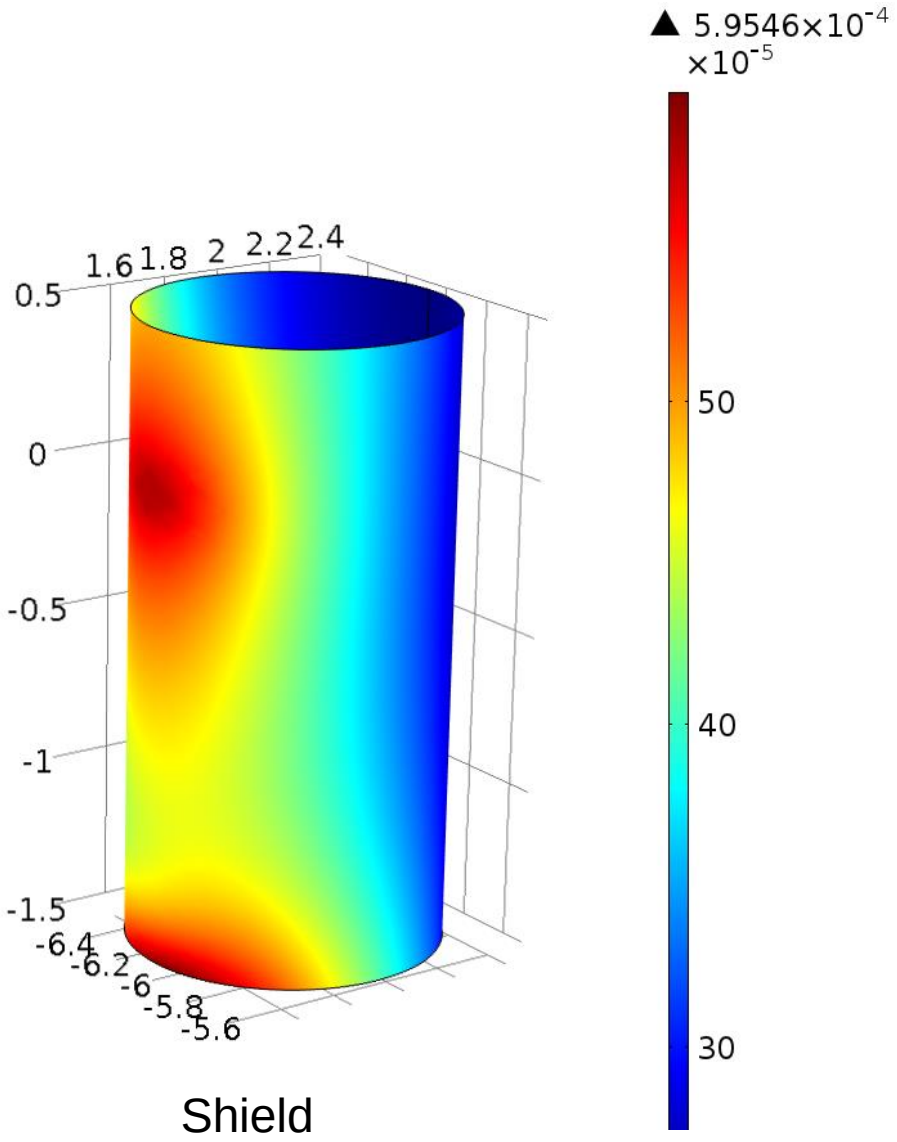



Step IV
200 MeV Flip

# 240 MeV Solenoid/Flip Mode



# Field Tracker Cryostat

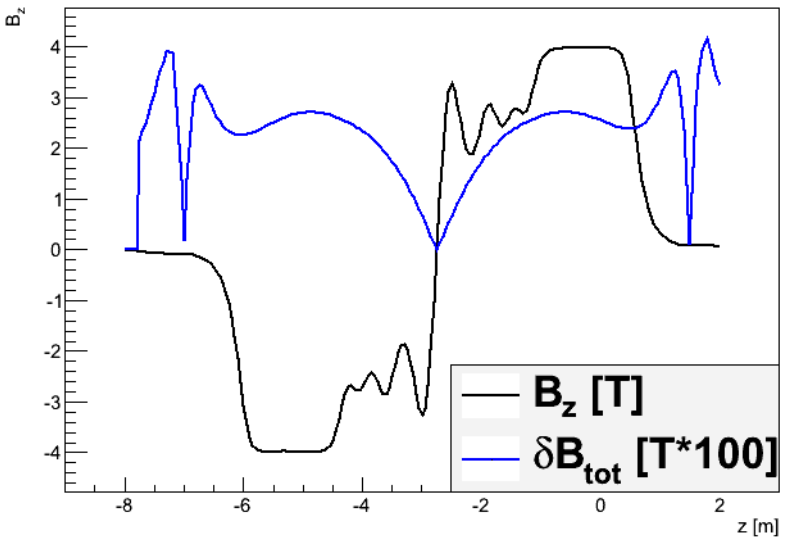


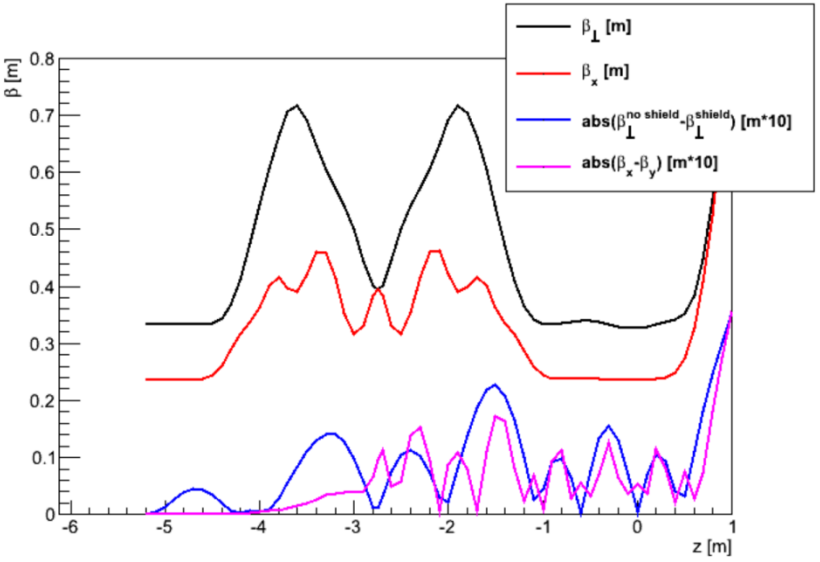

Shield

- Tracker readout position:
  - Diameter 1 m
  - Just next to shield
- Fields
  - No iron: 36.4 mT
  - Shield: 0.6 mT
  - **Difference: factor 60**
  - 240 MeV Solenoid (12 cm shield)
  - Falls off quickly

# Effect on Beam

- MAUS tracking study
  - 200 MeV Flip
  - Error field map: all iron versus no iron at all (worst case)
    - Original and current geometry
    - Misalignments (1 mm + rotation)
  - Discussed at MICE analysis meeting 24/1/2013
- Conclusion
  - …**barely measurable effect** on the beam travelling through MICE.
  - **There is no reason**, from a beam dynamics perspective, **not to implement a shielding wall** as described herein.

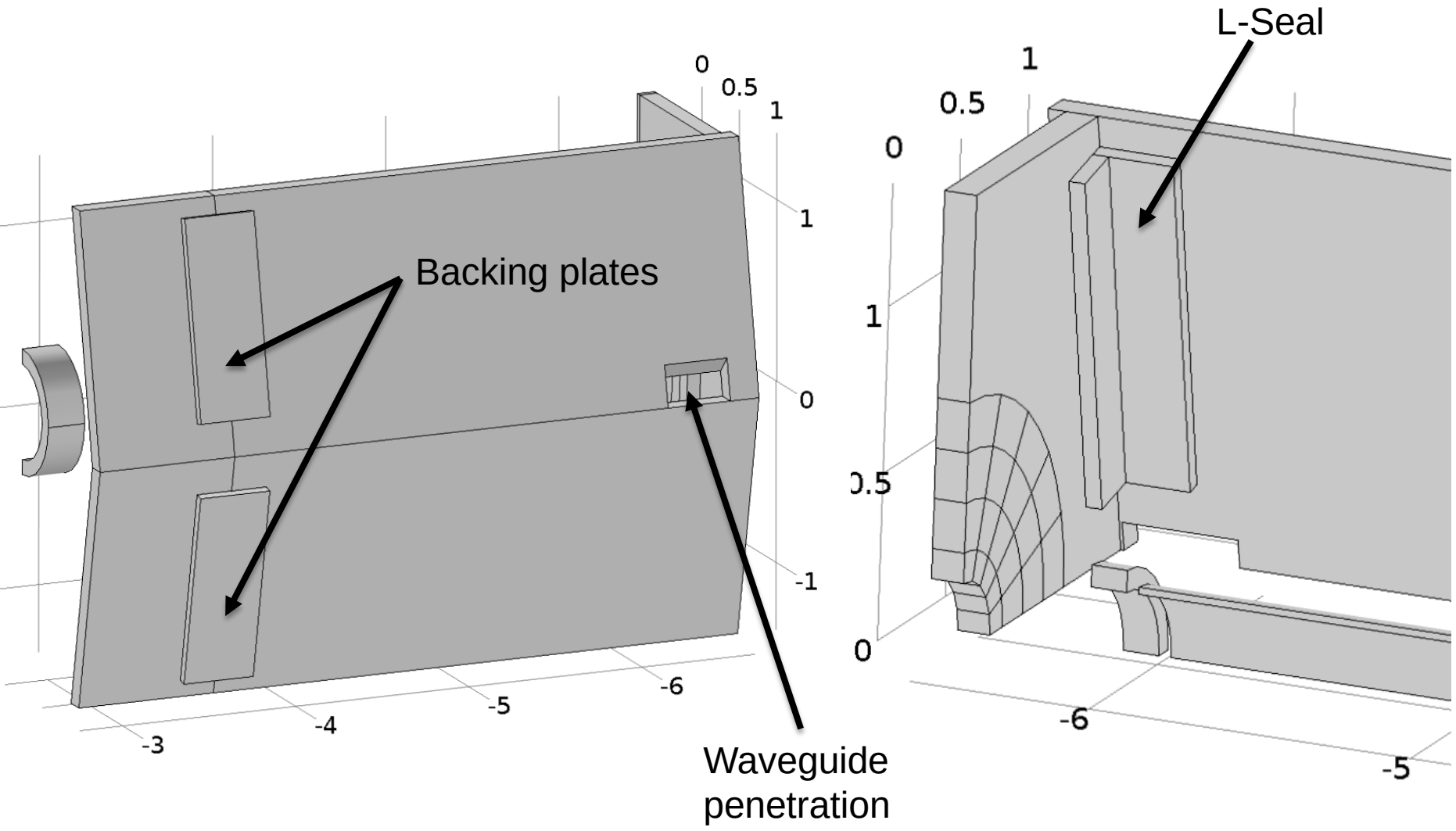


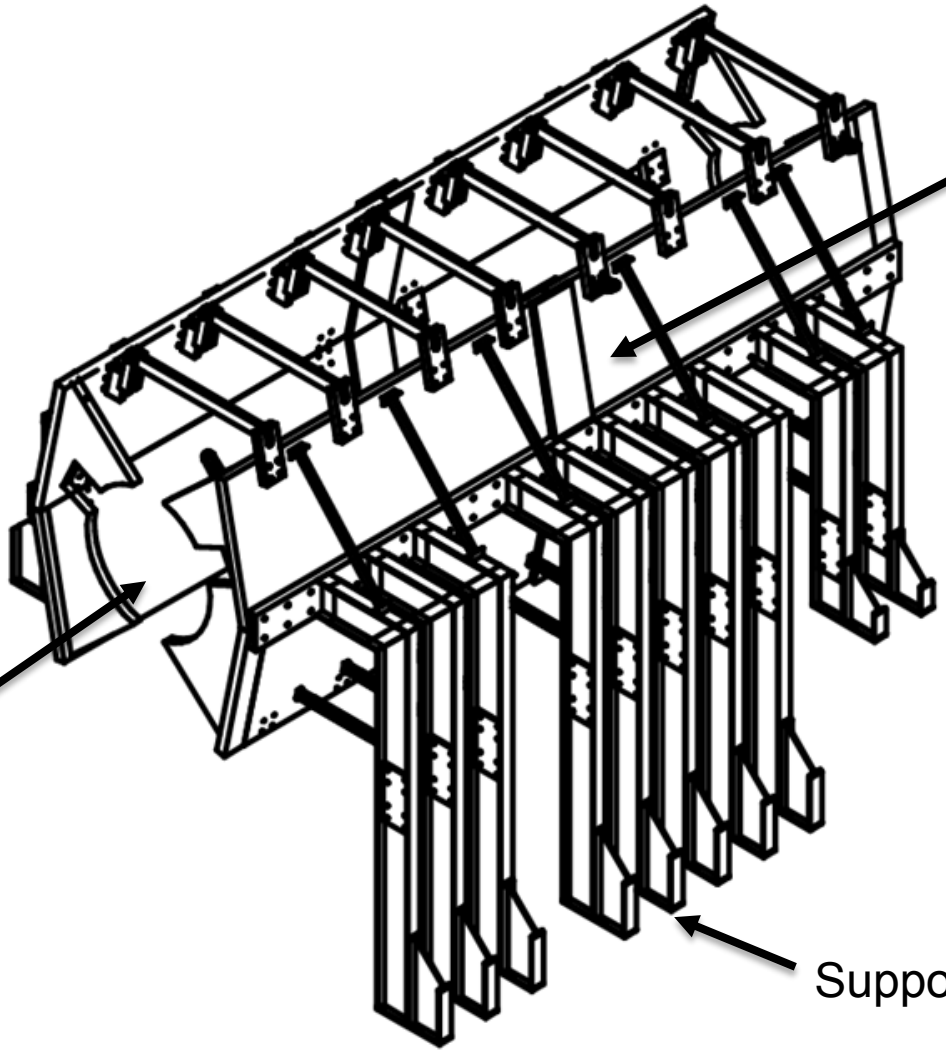

C. Rogers and H. Witte. Effect Of Iron Partial Return Yoke on the MICE Beam. 23/01/2013, http://micewww.pp.rl.ac.uk/issues/1161

# Engineering

# Connections

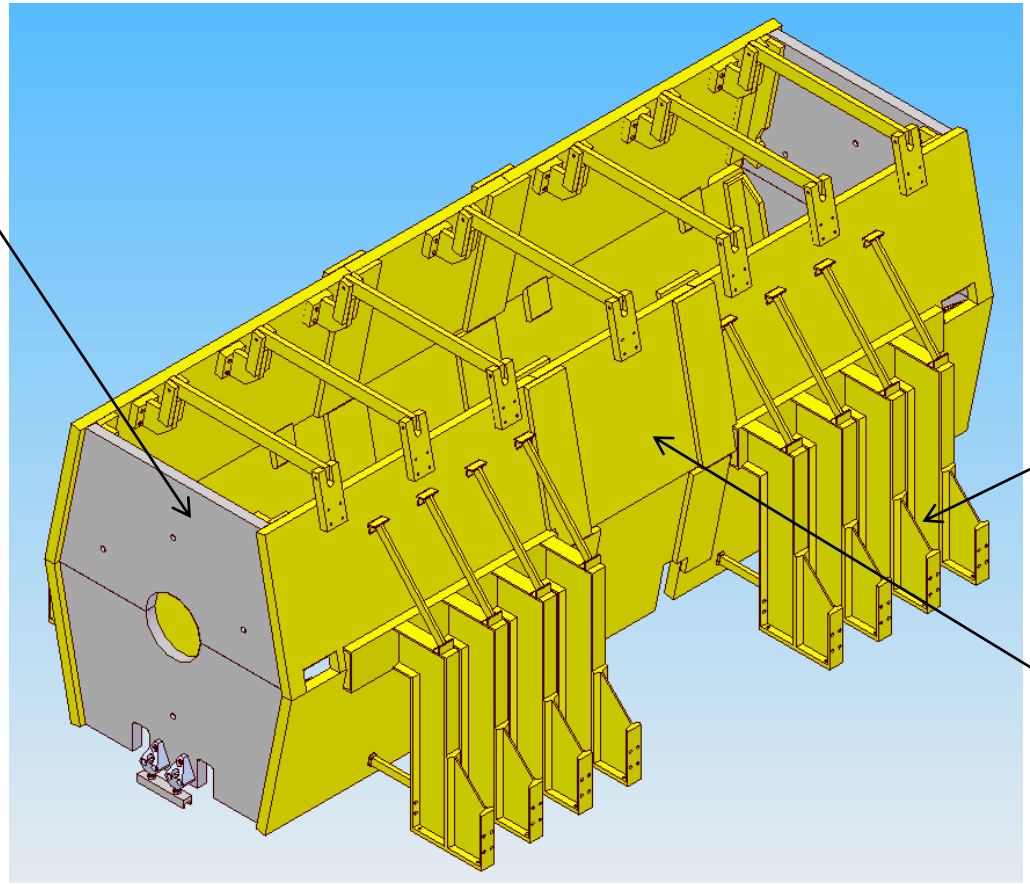


# September 2013 Review



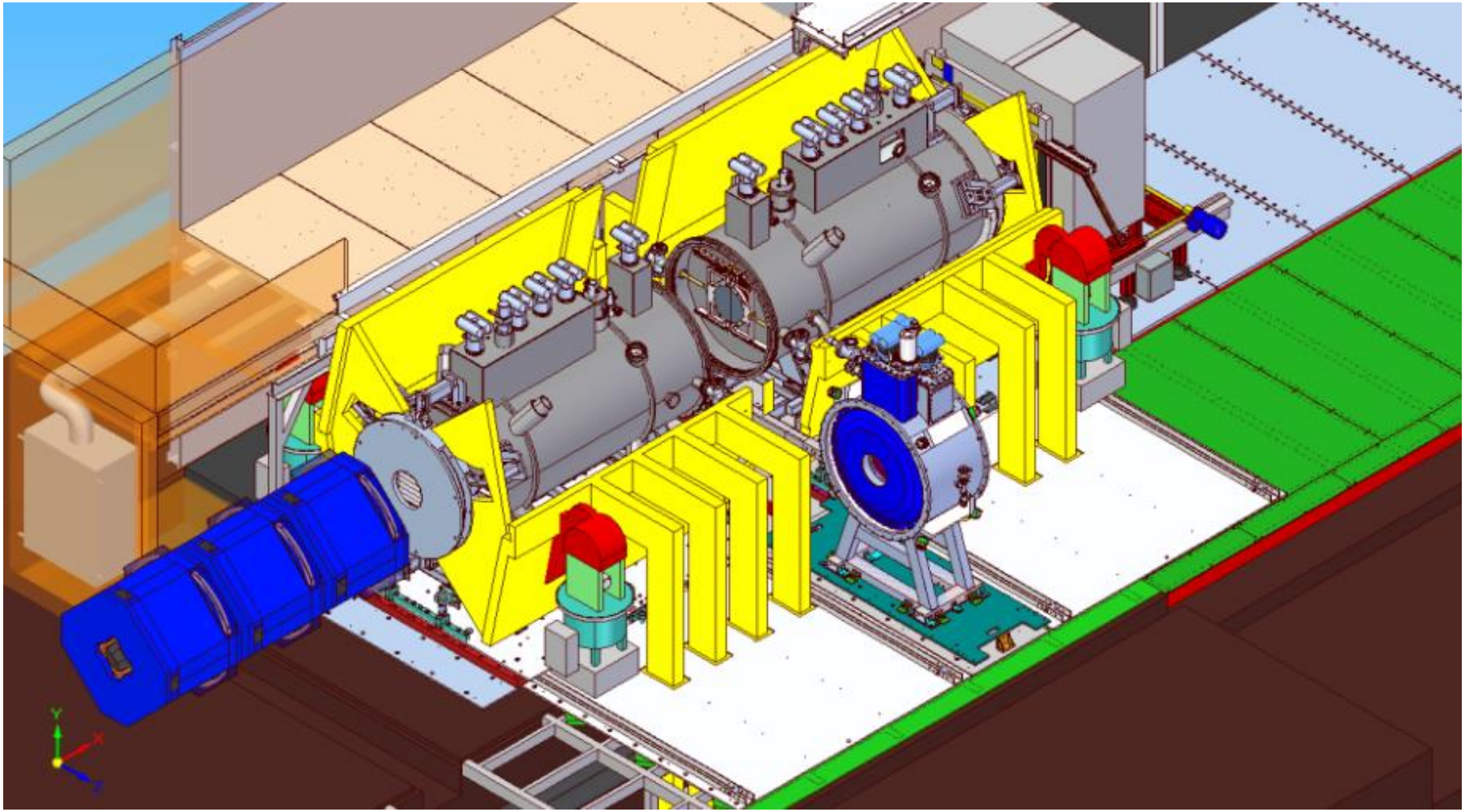

Courtesy of J. Tarrant / S. Plate

# Present Status



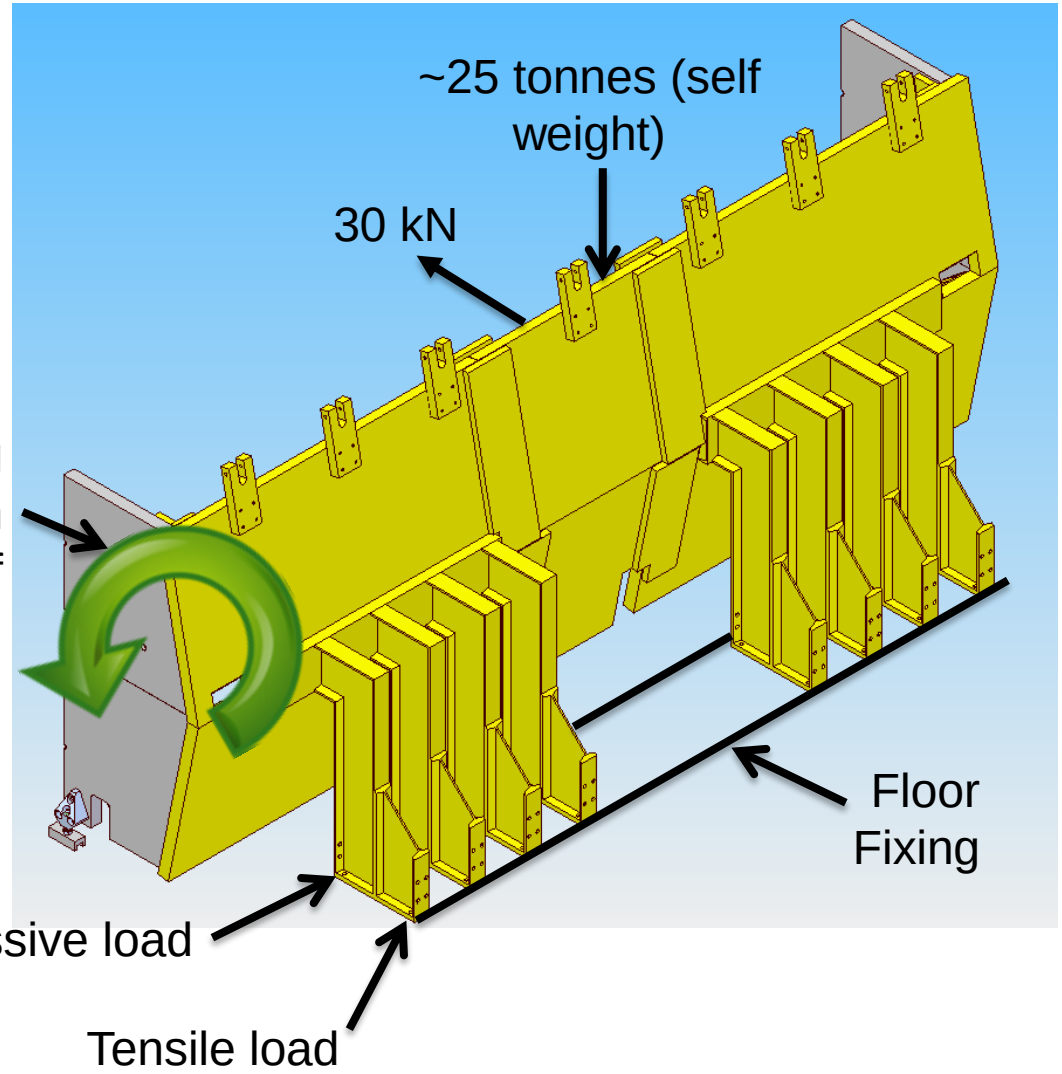

Courtesy of J. Tarrant / S. Plate

# Absorber Change

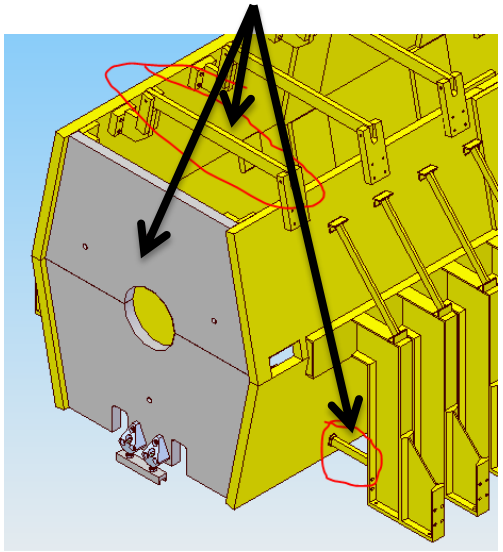


Procedure in place (J. Tarrant)

# Forces




NO CAPACITY FOR SIGNIFICANT MAGNETIC LOAD IN FLOOR FIXING:
Cross-bars, leg ties & link plates will take magnetic loads

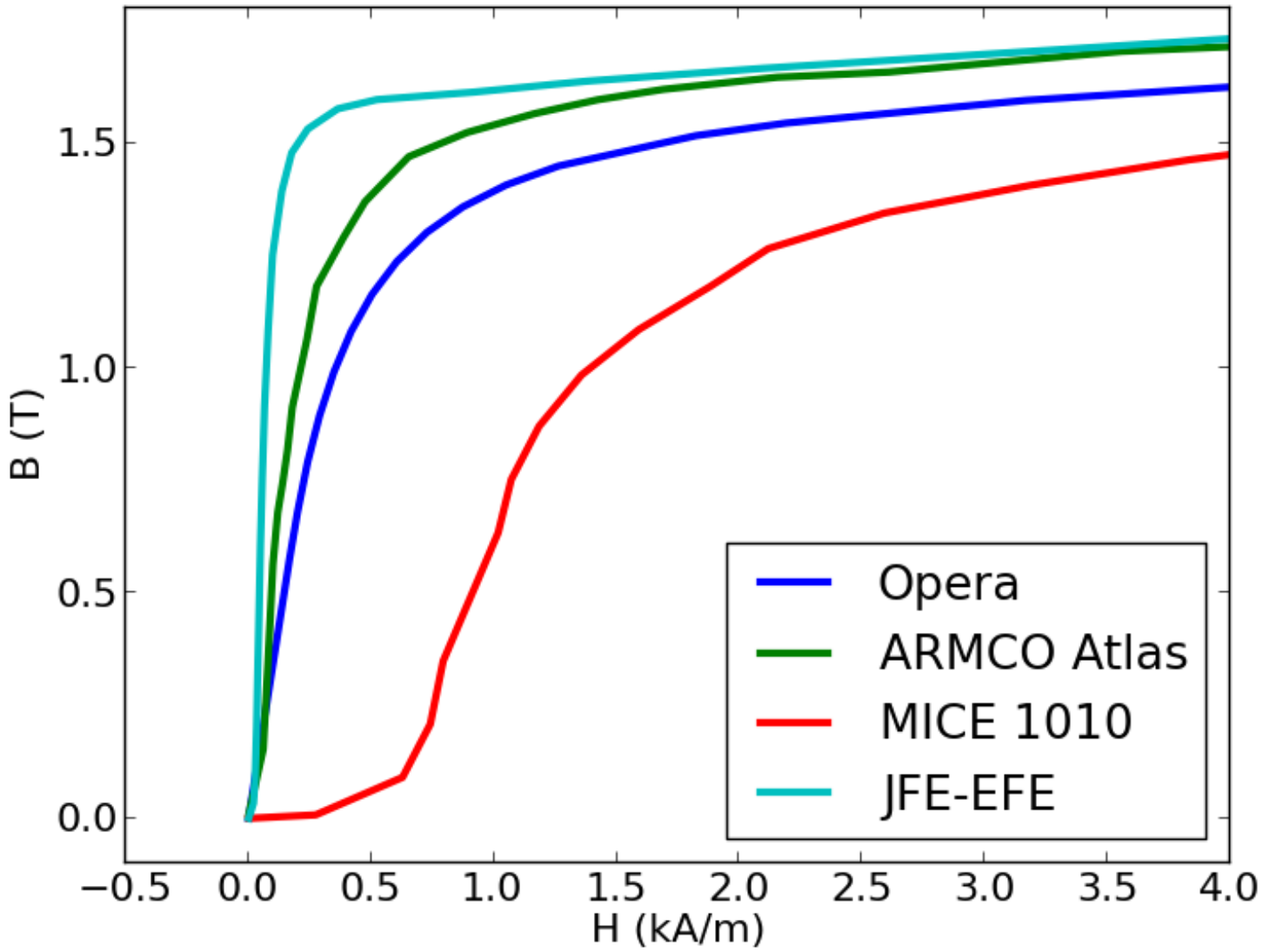


# Force Scenarios

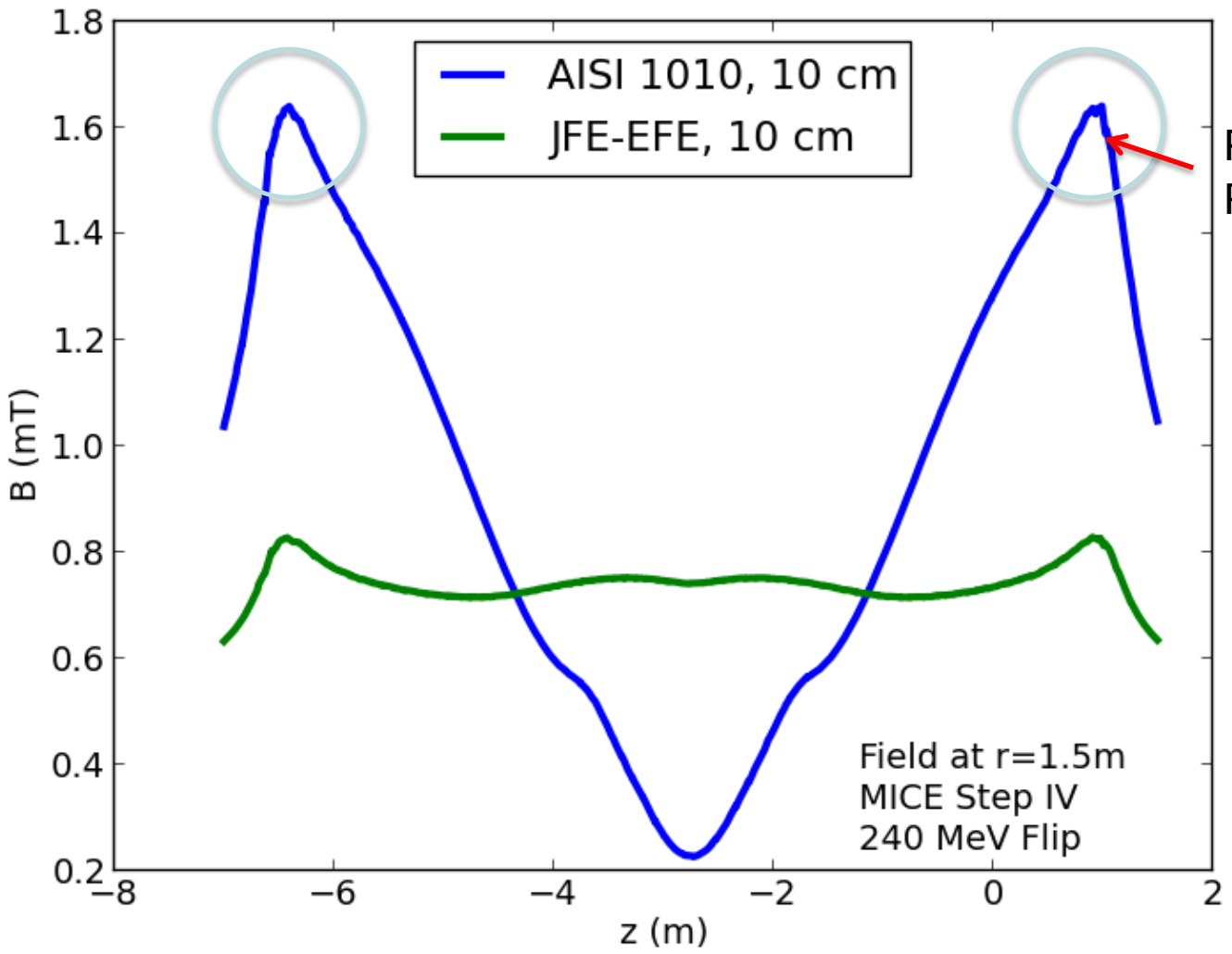
- Nominal cases
  - 200/240 MeV flip/solenoid mode
- Commissioning
  - Single spectrometer powered
  - Both spectrometers powered
  - AFC powered
- Worst case analysis
  - Increased forces by factor 5
  - **Still very safe**
- Monitoring: draw-wire sensor


WDS-3000-P115-CA-P

# Materials


B (T)
1.5
1.0
0.5
0.0
−0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
H (kA/m)
Opera
ARMCO Atlas
MICE 1010
JFE-EFE

# Material




Fiber Tracker
Readout location

# Timeline

- Production Readiness Review (PRR) for PRY Monday 28th April
  - Green light to proceed
- Steel procurement: order placed May 5th
- Framework and steel machining
  - RFQ: online May 14th (due June 5th)
  - Expect quotes from four vendors
  - Targeted award date: June 9th/16th
- South Wall complete October, 2014
- North Wall complete December, 2014

# Summary

- Performance
  - Reduces stray field to 5—10 Gauss
    (No shield: 300—600 Gauss = factor 50+)
- Effect on beam: no issue
- Engineering
  - Finished
- Timeline
  - Procurement ongoing

# Additional Slides

# 240 MeV Solenoid/Flip Mode