Holger Witte
Brookhaven National Laboratory
Advanced Accelerator Group
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

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

(Note: not to scale)
Principle
Partial Return Yoke

Support Structure

Shielding plates

3m

8m

Courtesy of Jason Tarrant / Steve Plate
Performance
5 Gauss Surface

PRY

MICE Solenoids

No iron

30 May 2014
Iso-Surface 0.5 mT

No Shield

12 cm Shield

9 m

Step IV
200 MeV Flip

MICE Solenoids
240 MeV Solenoid/Flip Mode

![Graph showing magnetic field distribution at r=1.5m for MICE Step IV 240 MeV](image)

- Blue line: \( t=10 \text{ cm} \)
- Green line: \( t=12 \text{ cm} \)
- Red line: No iron, Sol
- Cyan line: No iron, Flip

Field at \( r=1.5 \text{ m} \)
MICE Step IV 240 MeV
Field Tracker Cryostat

- 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.

Engineering
Connections

- Backing plates
- Waveguide penetration
- L-Seal
September 2013 Review

Space for Virostek Disc

No access to absorber

Support anchored in ‘trench’

Courtesy of J. Tarrant / S. Plate
Present Status

- 6 Piece Design with central access to AFC for absorber changes
- Simplified end-plates
- Reduced number of more compact legs now with symmetry S-N

Courtesy of J. Tarrant / S. Plate
Absorber Change

Procedure in place (J. Tarrant)

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Forces

~25 tonnes (self weight)

30 kN

Load trying to overturn PRY half

Compressive load

Tensile load

Floor Fixing

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

30 May 2014
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
Material

Fiber Tracker Readout location

Field at r=1.5m
MICE Step IV
240 MeV Flip
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
240 MeV Solenoid/Flip Mode