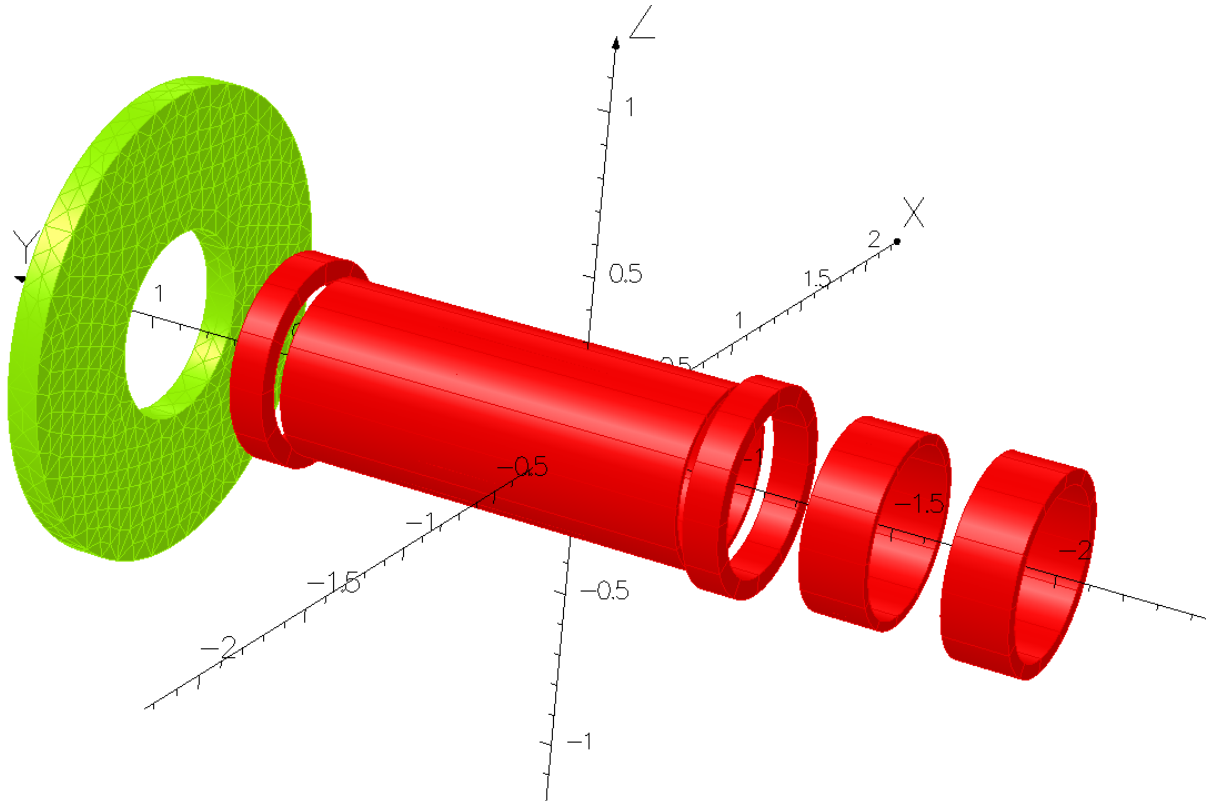


Field Mapping of Tracker

Holger Witte
Brookhaven National Laboratory
Advanced Accelerator Group

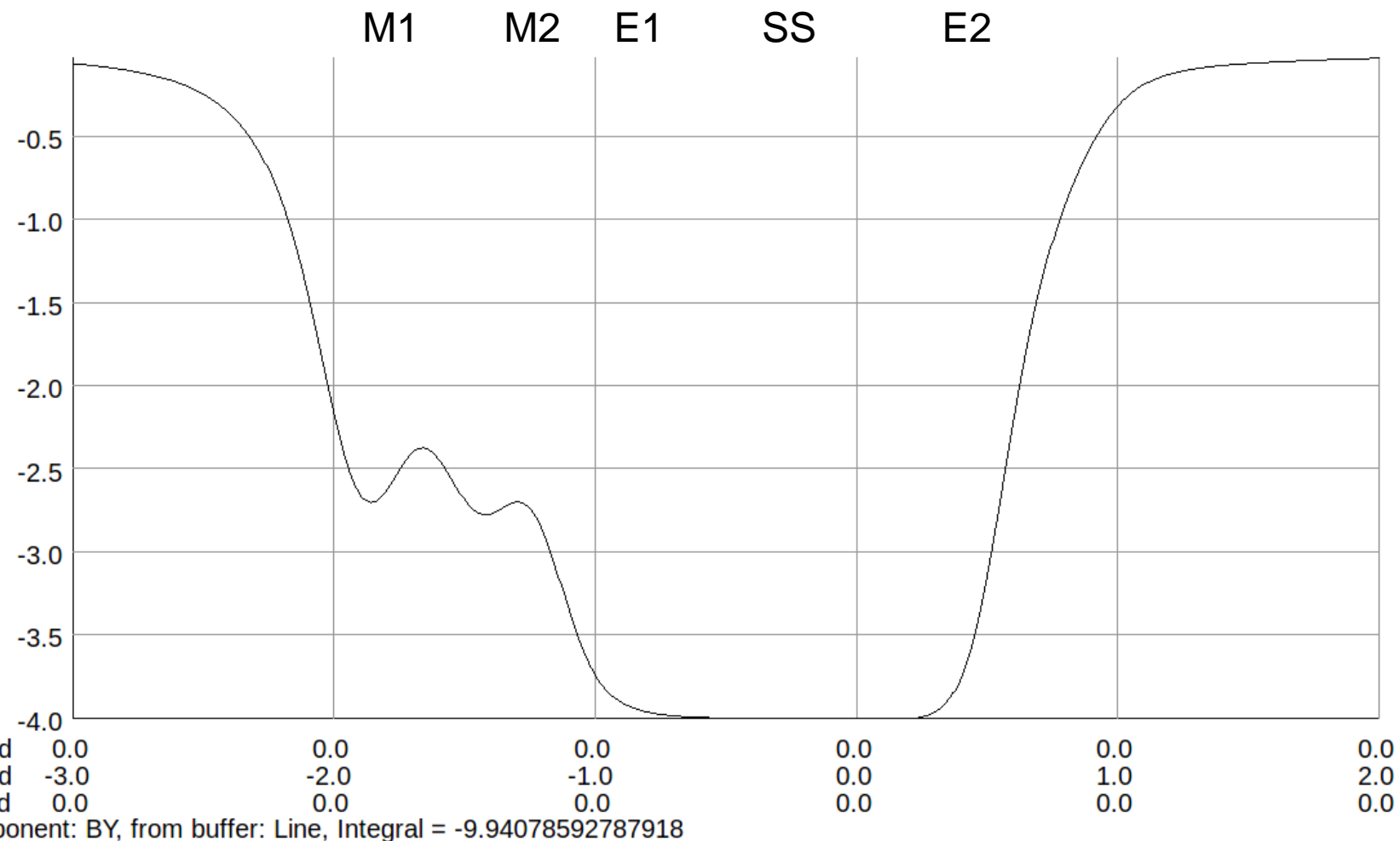
- Field mapping of tracker solenoid
 - Plan: measure tracker in MICE hall
 - (On critical path)
- Question: can the tracker be measured somewhere else?
 - Potential issue: iron in MICE hall (walls, floor)
 - If yes, this would free up several weeks

Model 1 ('no walls')



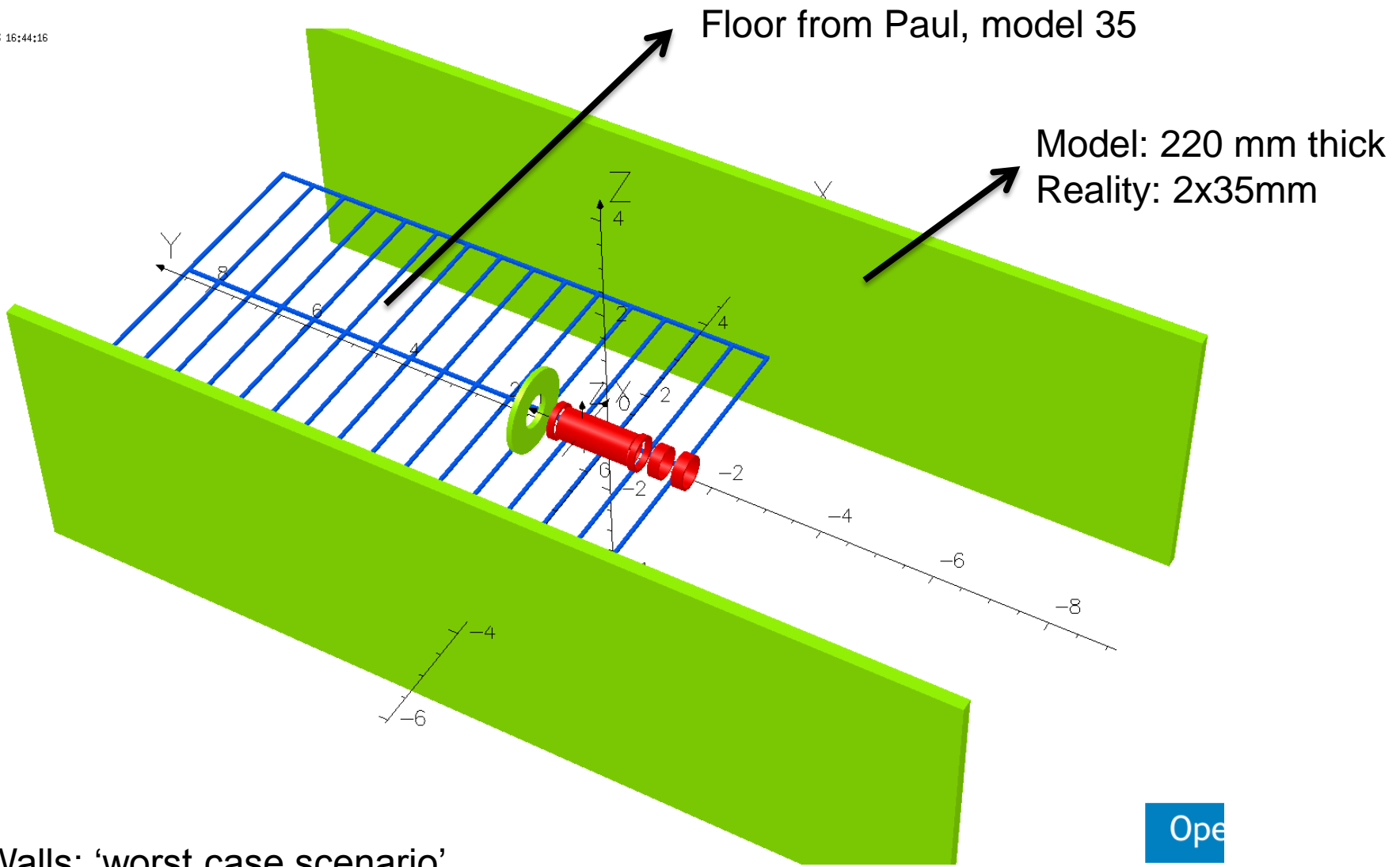
Includes Virostek plate
AISI 1010 properties
Current densities: 200 MeV flip mode

Field On-Axis



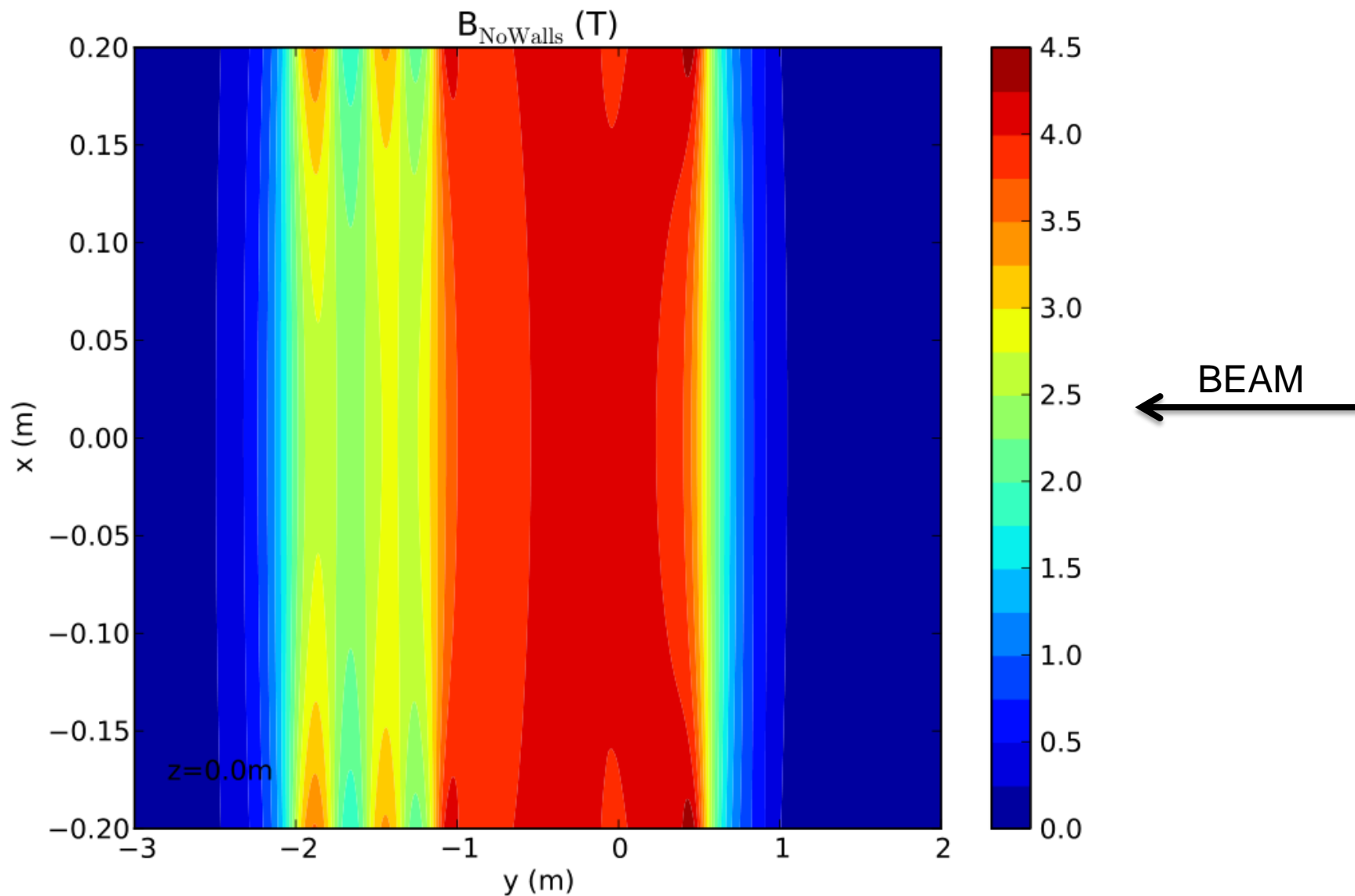
Model 2

2013 16:44:16

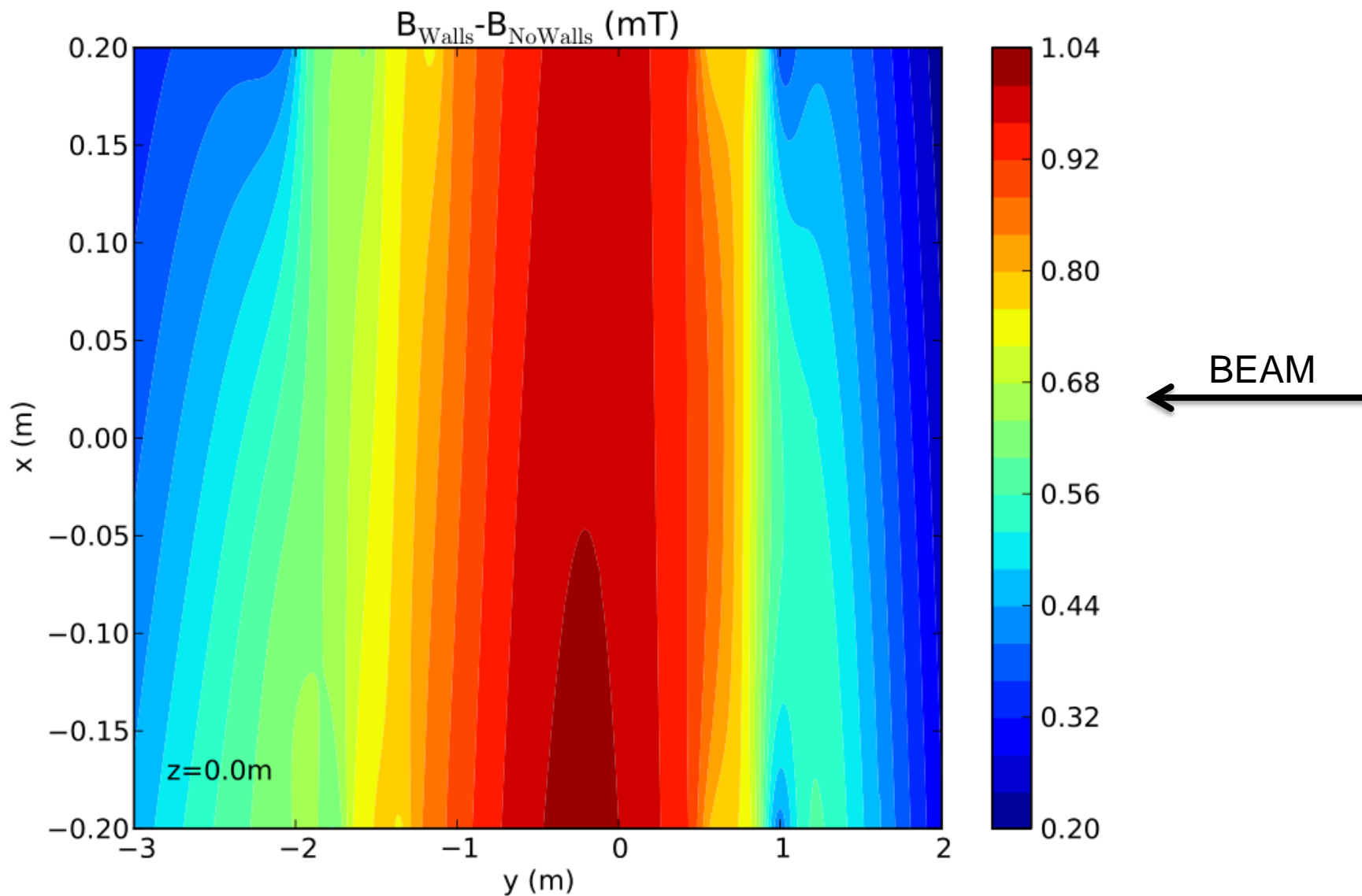


- Opera 3D: look for relative change
 - Create field map for model 1&2
 - Subtract fields: $|B_2 - B_1|$
- Both models use identical mesh density
- Field evaluation:
 - Iron: nodal interpolation
 - Coils: Integration
- Benchmarking:
 - First set of simulations: linear element
 - Second set: quadratic element
 - Both agree (\sim %, w.r.t. difference field)Results shown: 2nd order element

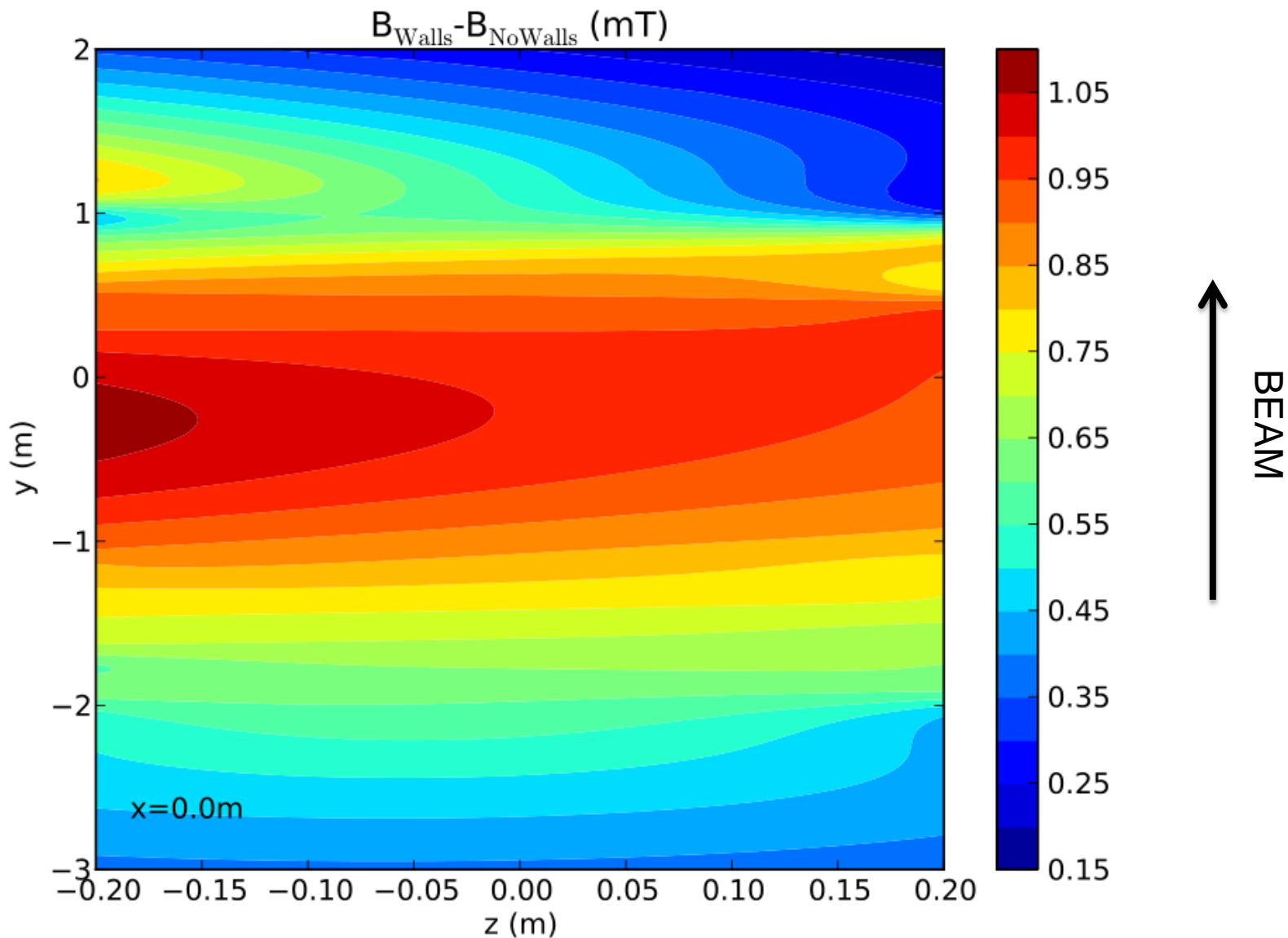
Example: Field on Hor. Plane



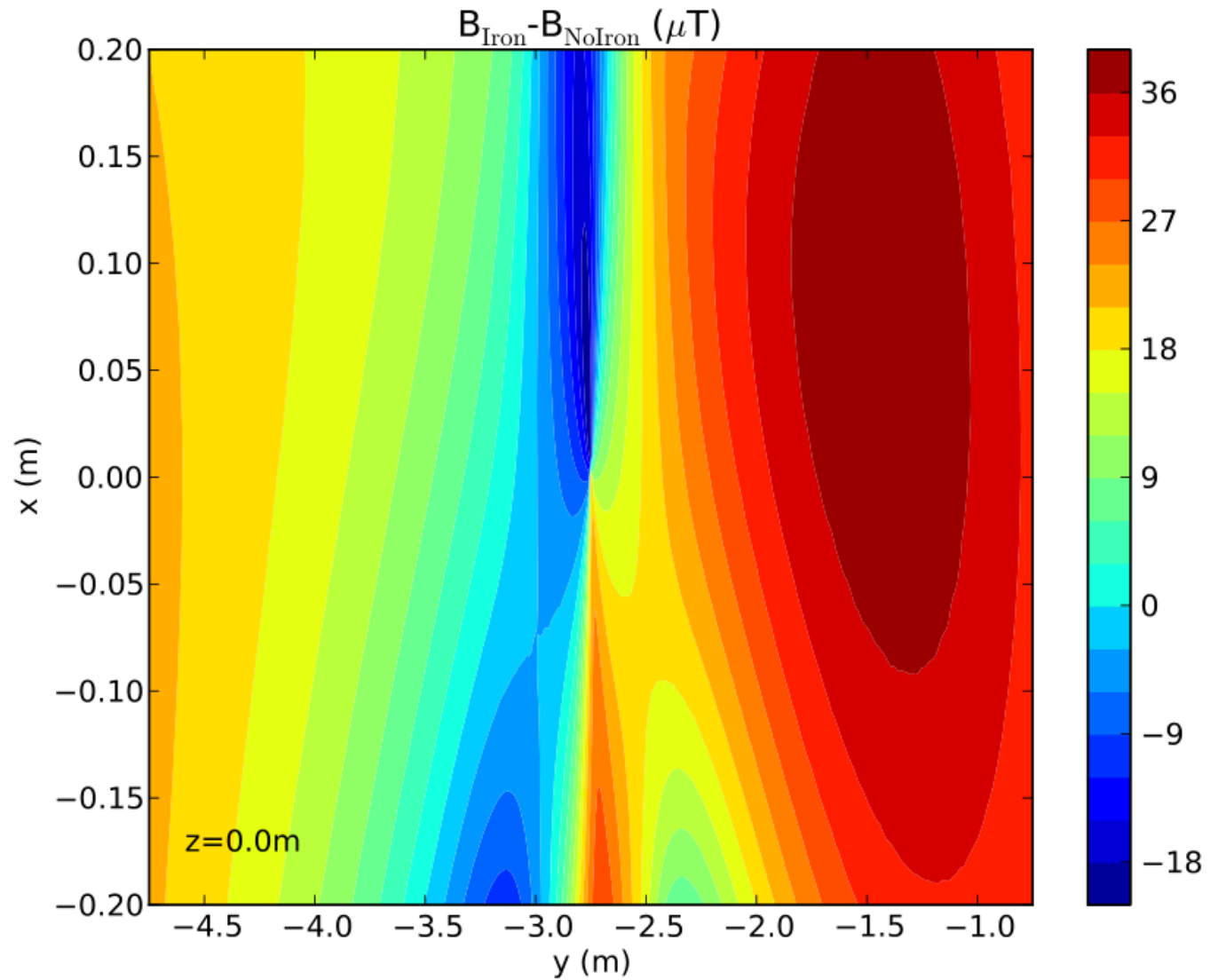
Result: Difference in B, Hor. Plane



Result: Difference in B, Vert. Plane



Similar Study for AFC



200 MeV Flip
Linear element

- Error field due to iron in MICE hall:
 - Tracker: ~ 1 mT
 - AFC: < 50 μ T
- AFC: no issue (similar to earth magnetic field)
- PS for Tracker
 - Current precision: 1 part in 10^4
 - Reproducibility: 1 part in 10^3
 - Info from LBNL EE via Alan Bross
- Effect of similar magnitude