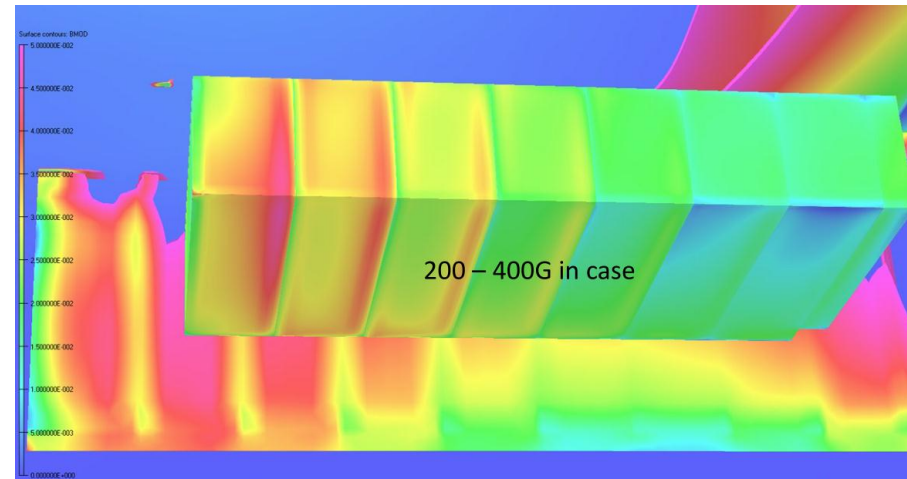


Racks and Compressors - Fields

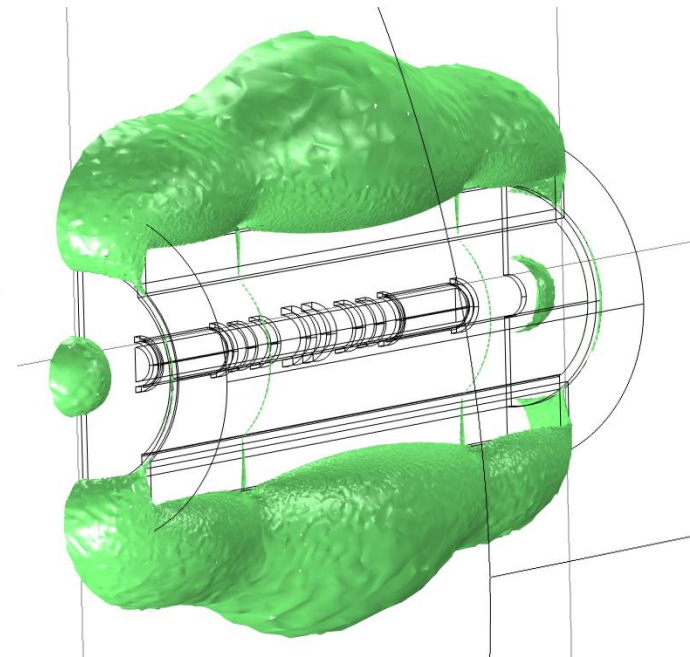
Holger Witte
Brookhaven National Laboratory
Advanced Accelerator Group

Introduction

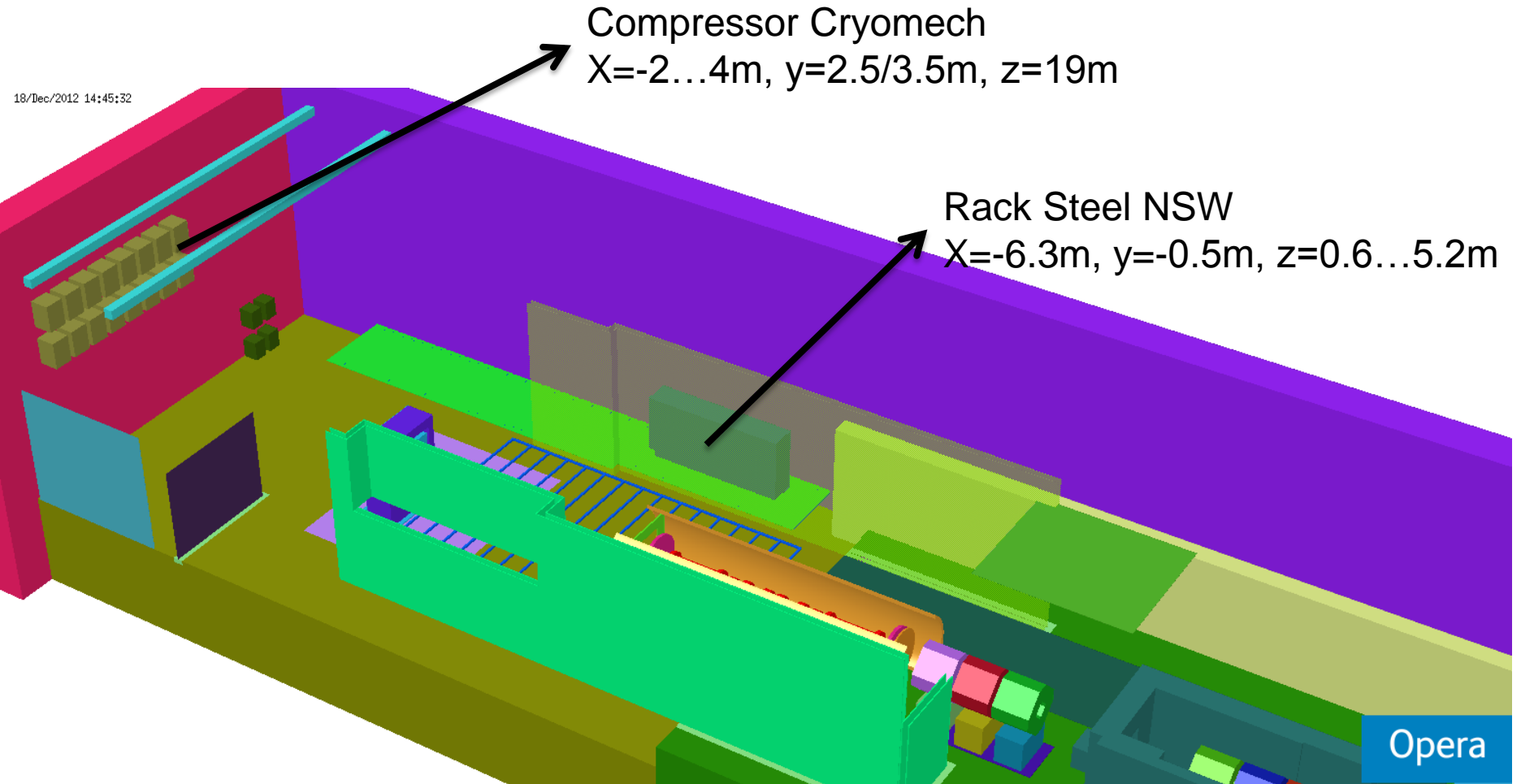
- Field in racks / cryocooler pumps a concern
- Opera models of hall show significant magnetization of racks
 - Some field in air inside racks
- Inherent disagreement with my simulations
 - Very low fields at position of racks/pumps
 - But: not all iron modelled
- Issue?



Iso-surface
1 mT



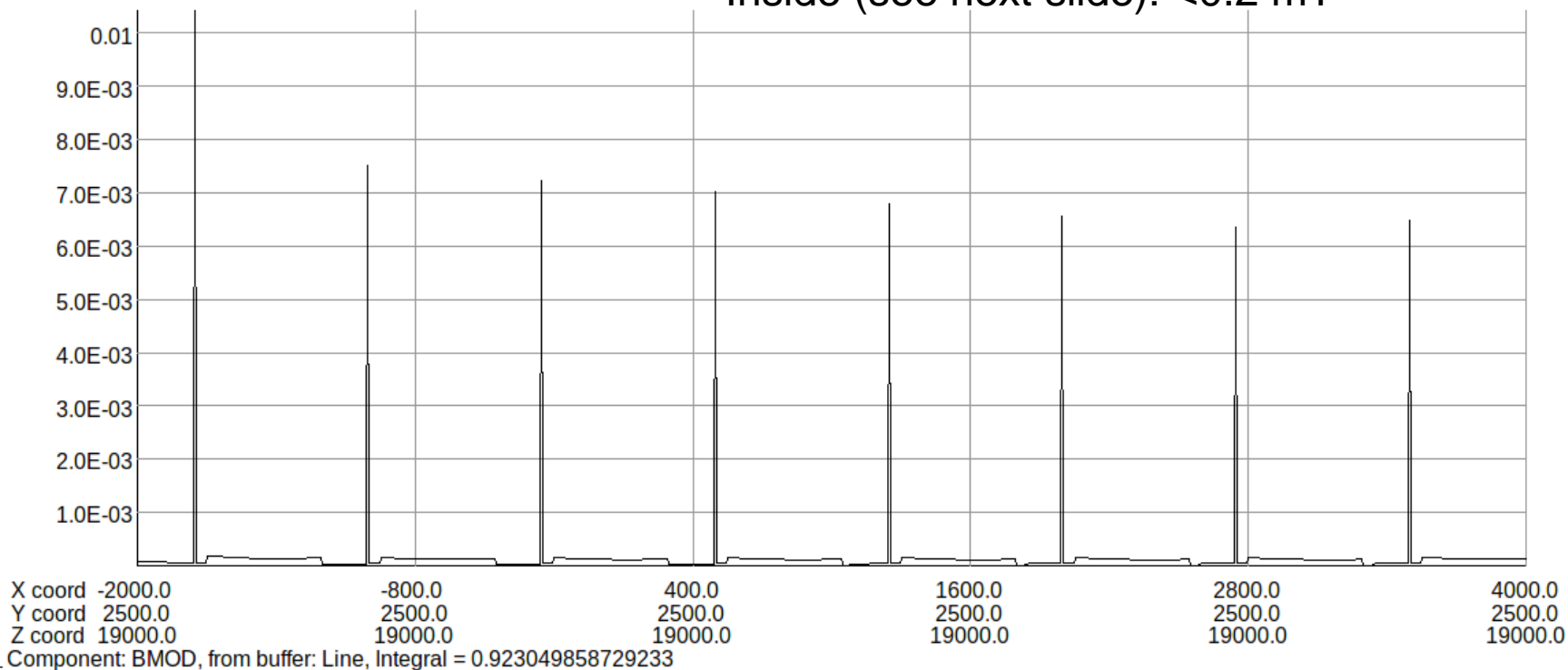
Overview



Opera Hall Model 35/36

17/Dec/2012 13:24:36

Field in iron: >5mT
Inside (see next slide): <0.2 mT



Position: Cryomech Compressors
Step IV, Solenoid Mode, 240 MeV



Opera Hall Model 35/36

17/Dec/2012 13:25:04



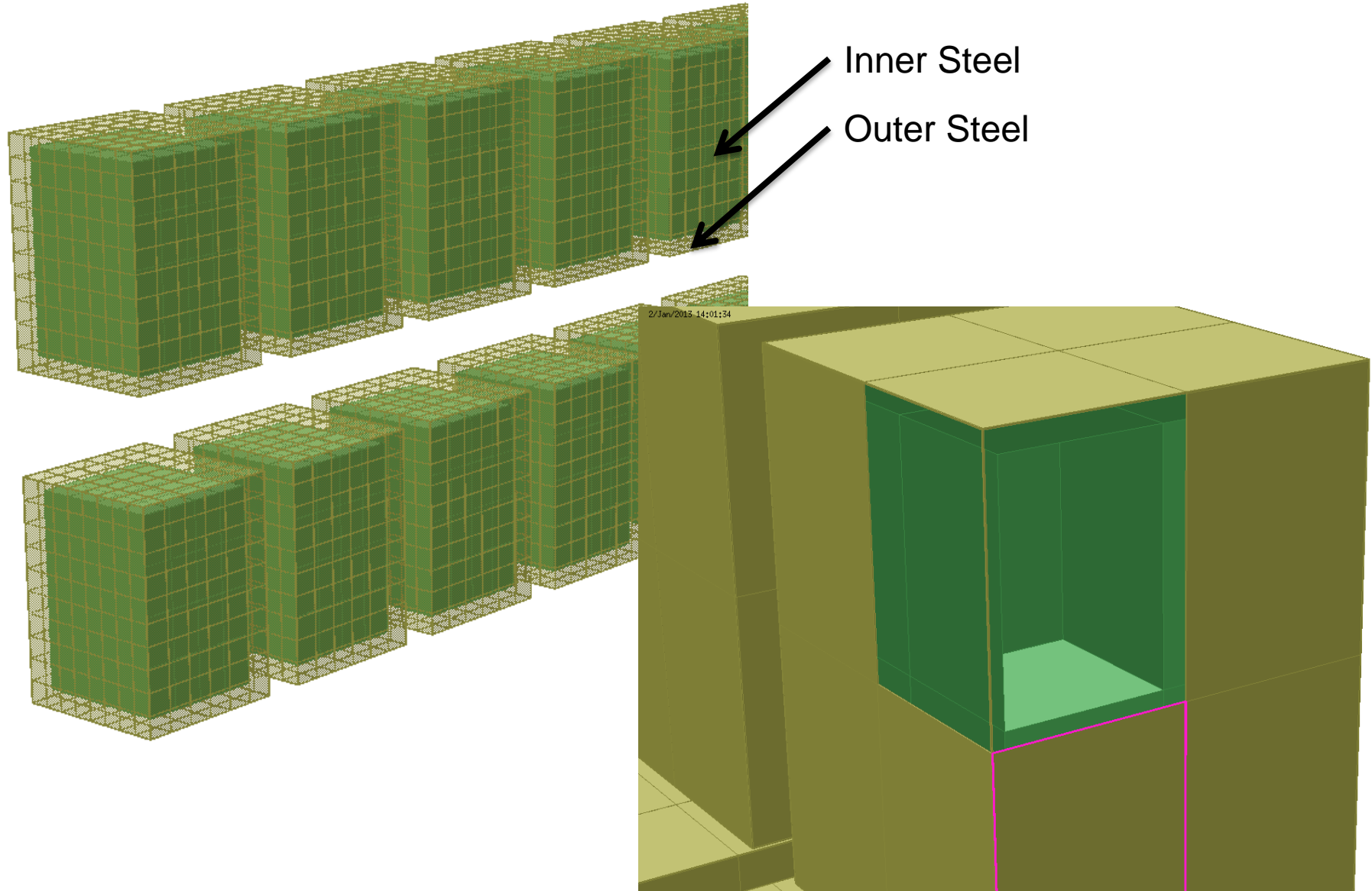
X coord	-2000.0	-800.0	400.0	1600.0	2800.0	4000.0
Y coord	2500.0	2500.0	2500.0	2500.0	2500.0	2500.0
Z coord	19000.0	19000.0	19000.0	19000.0	19000.0	19000.0

Component: BMOD, from buffer: Line, Integral = 0.923049858729233

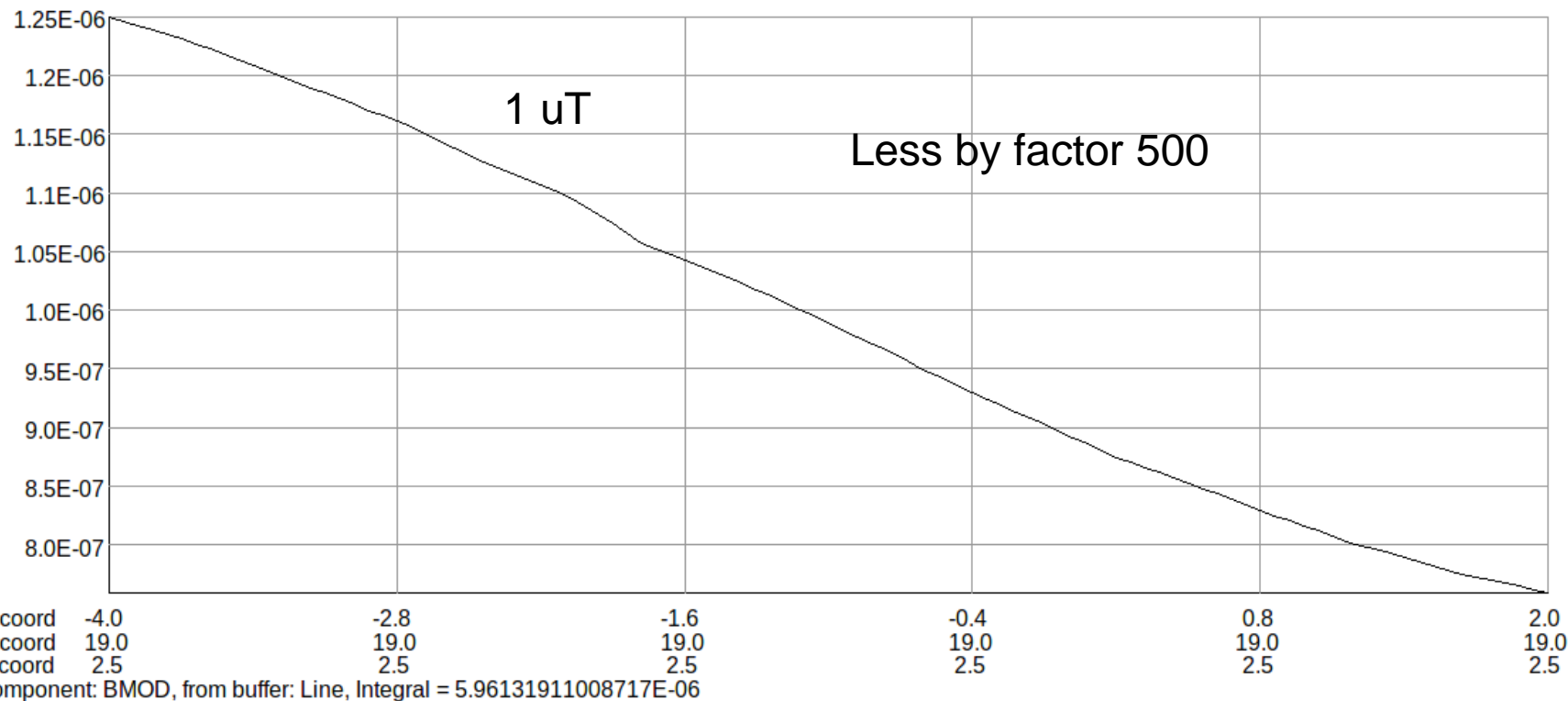
Requires explaining



Cryomech Compressors

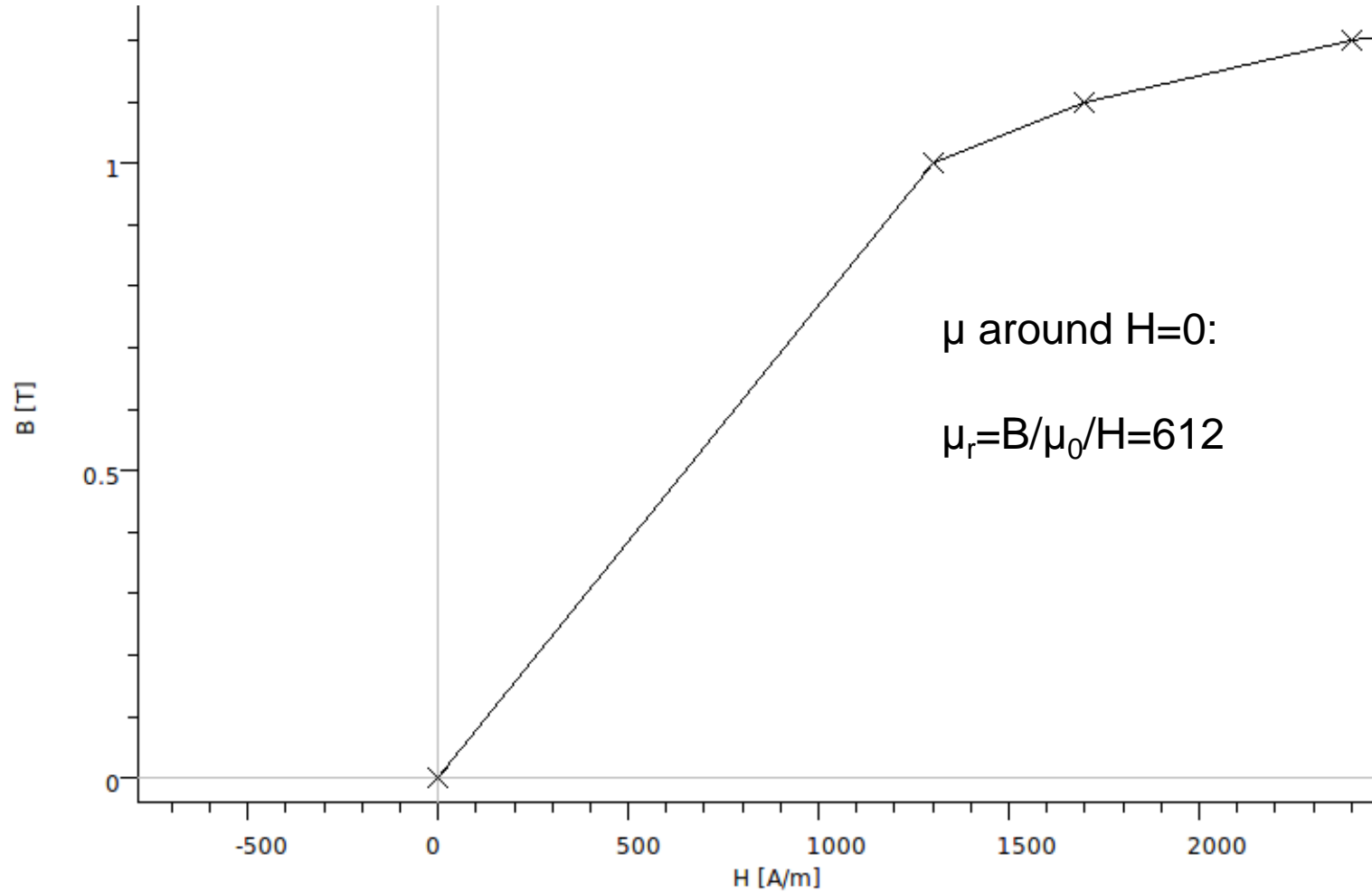


My Simulation

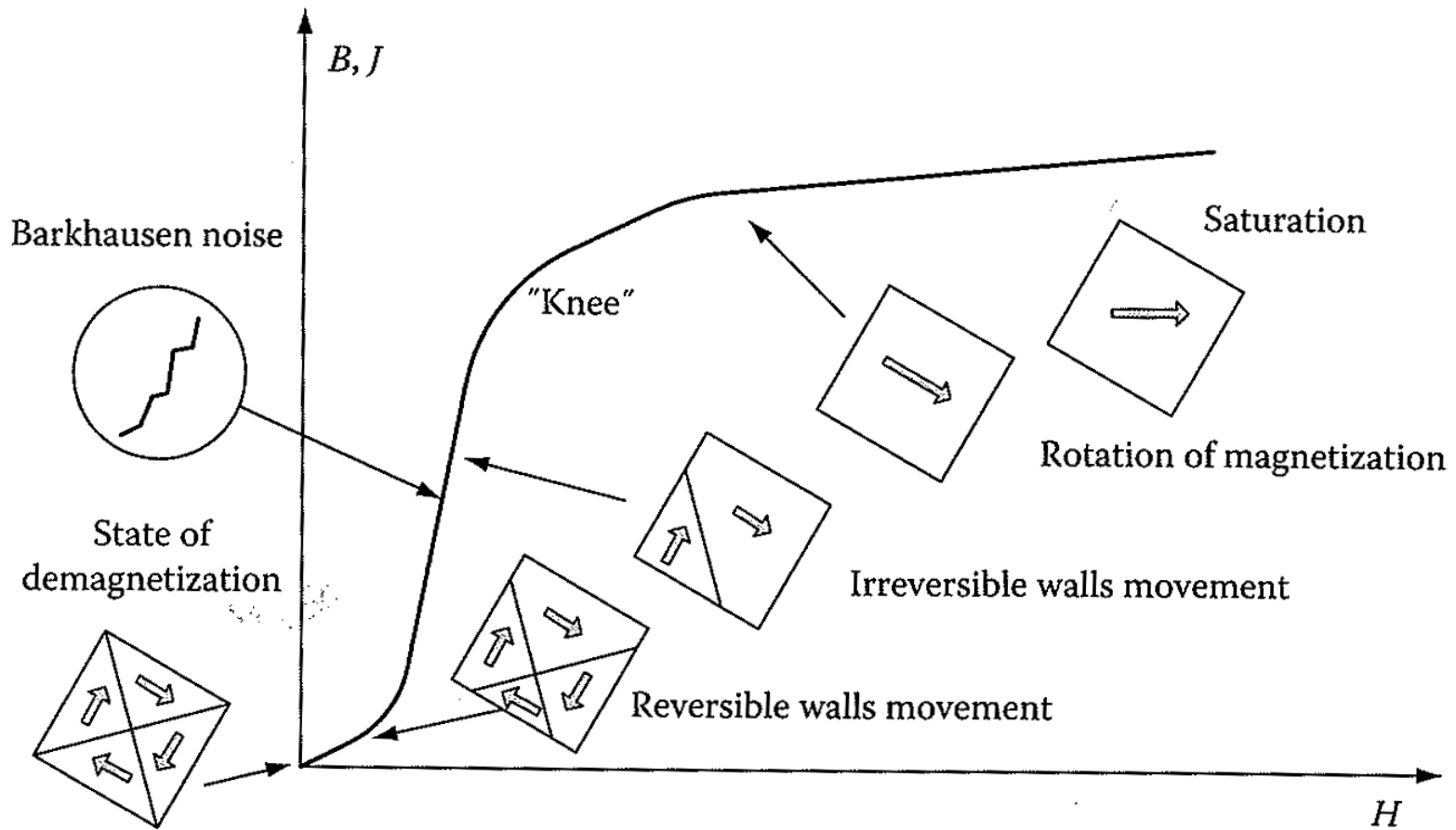


Field at same position, with shield
No racks

Iron – Mild Steel

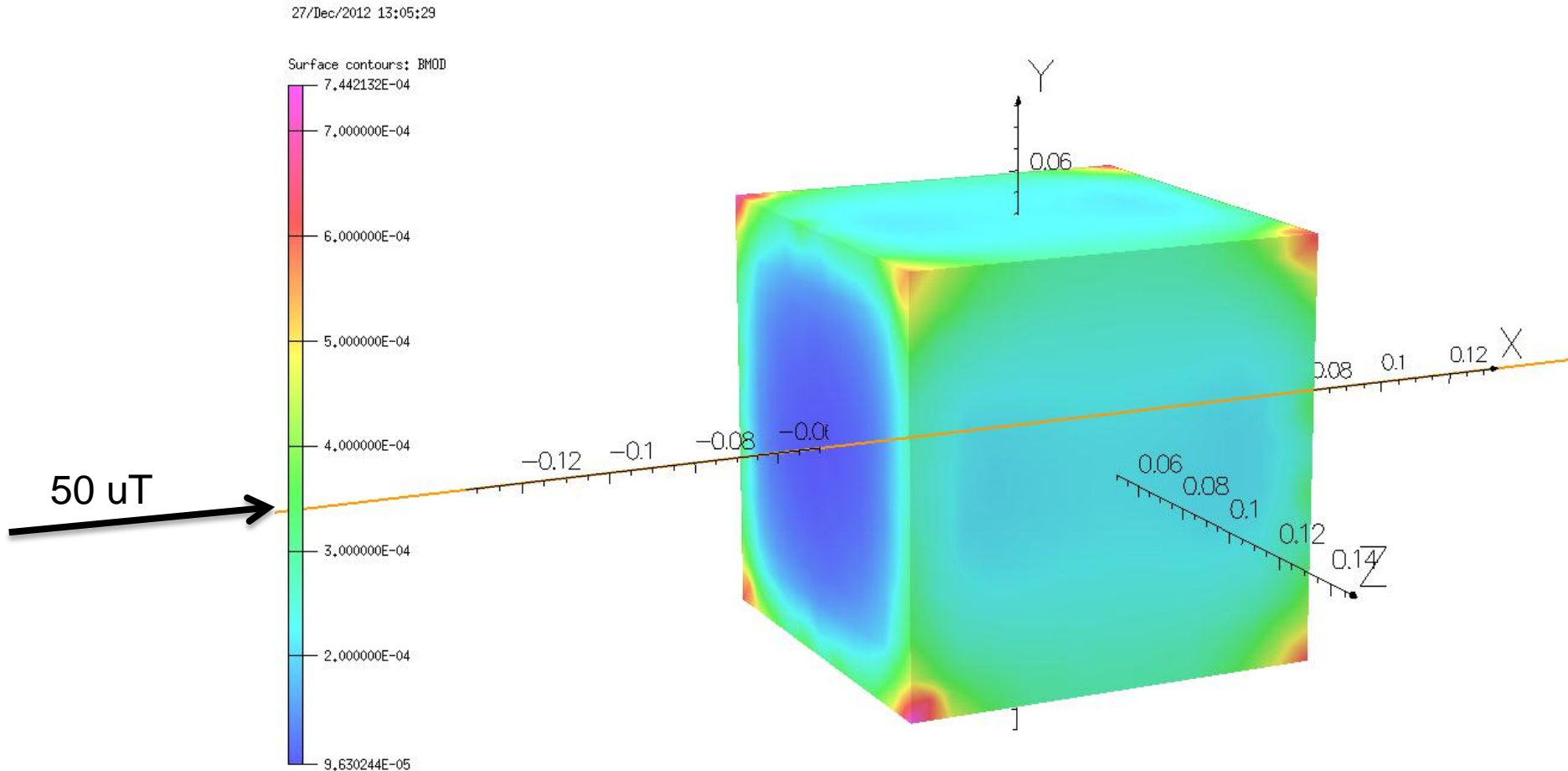


BH Curves



From: S Tumanski, Handbook of Magnetic Measurements, 2011.

Simple Experiment

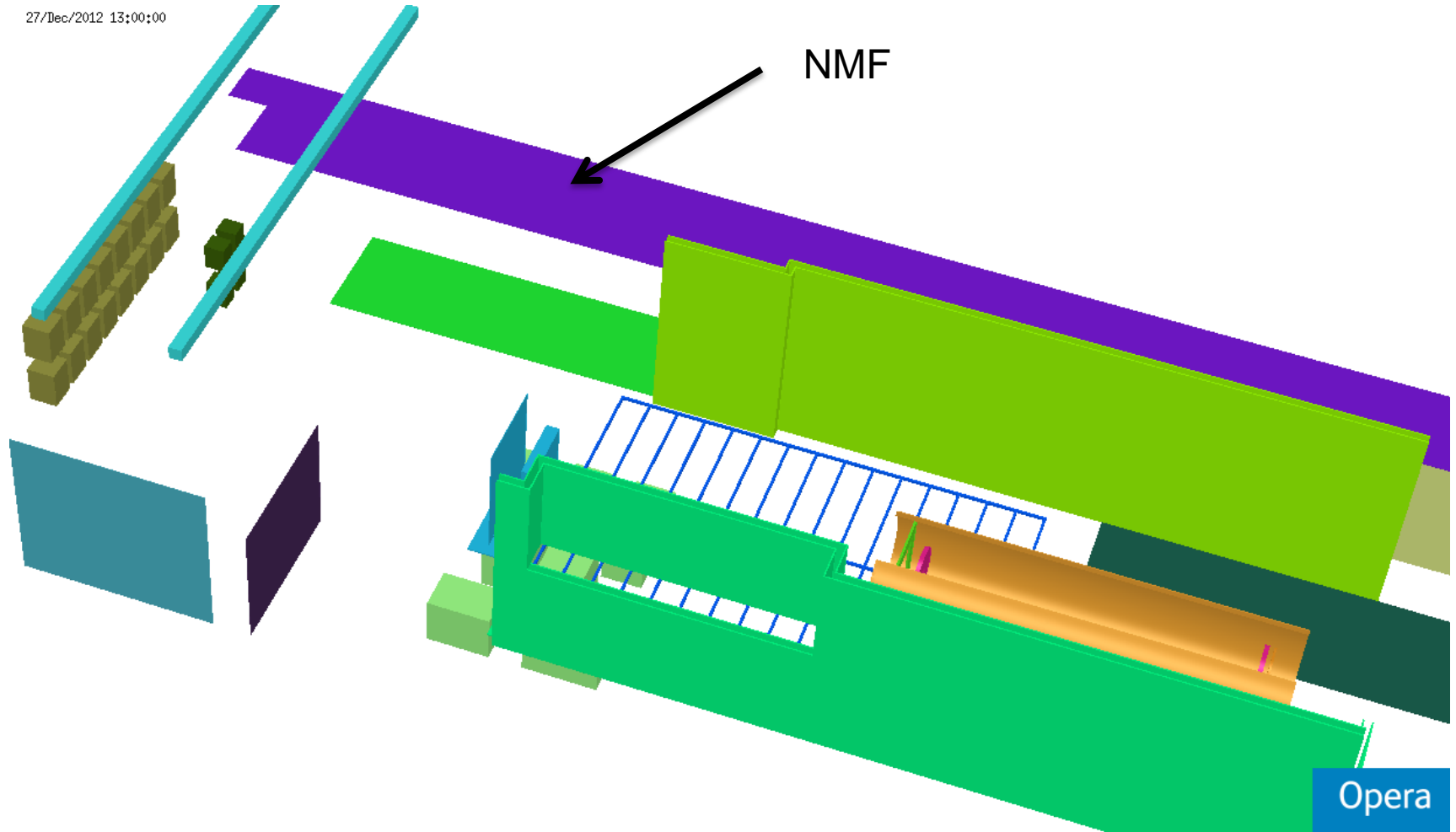


Piece of iron in uniform external field (50 uT)

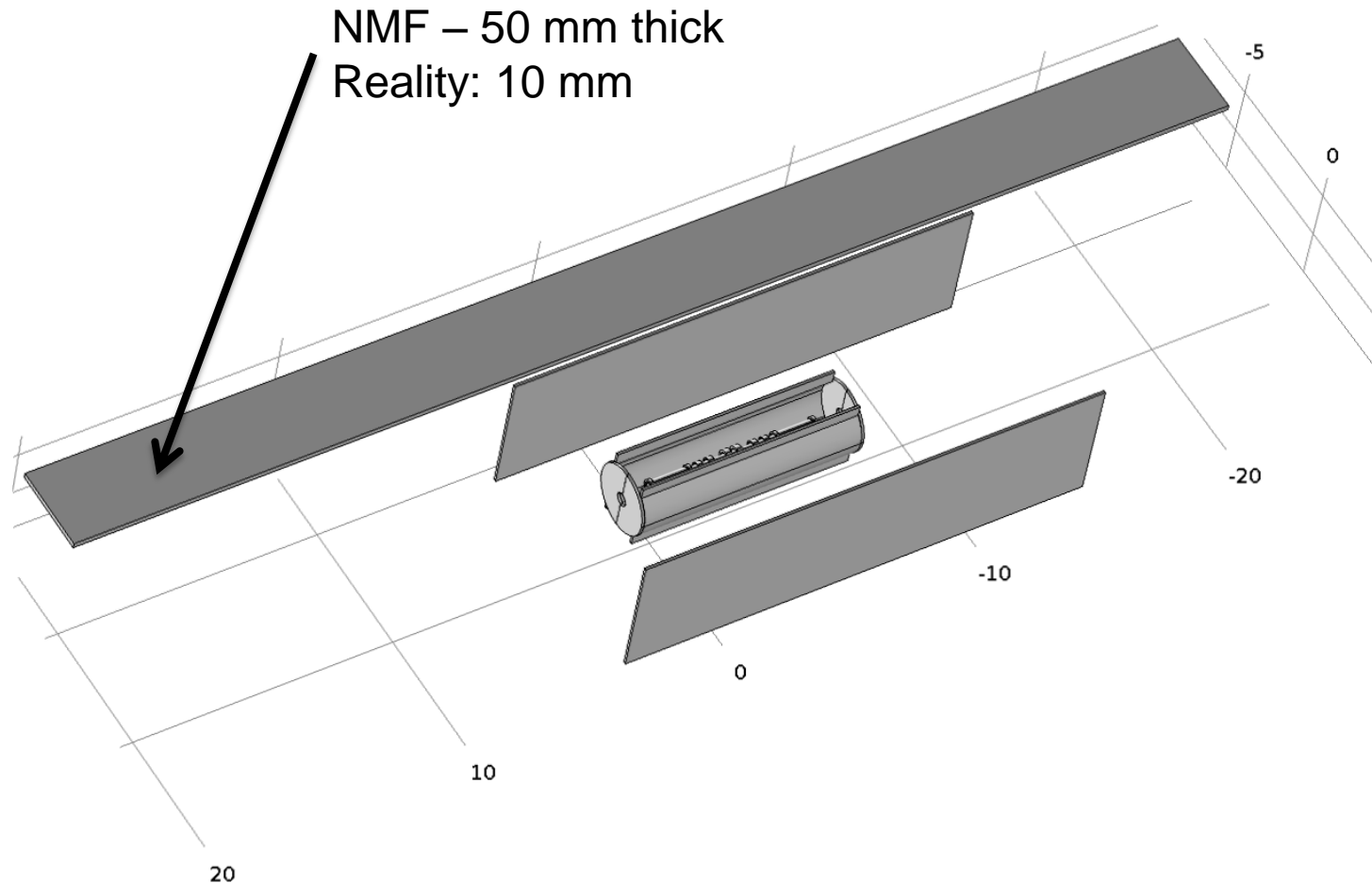
Central field: 180 uT (factor 4)

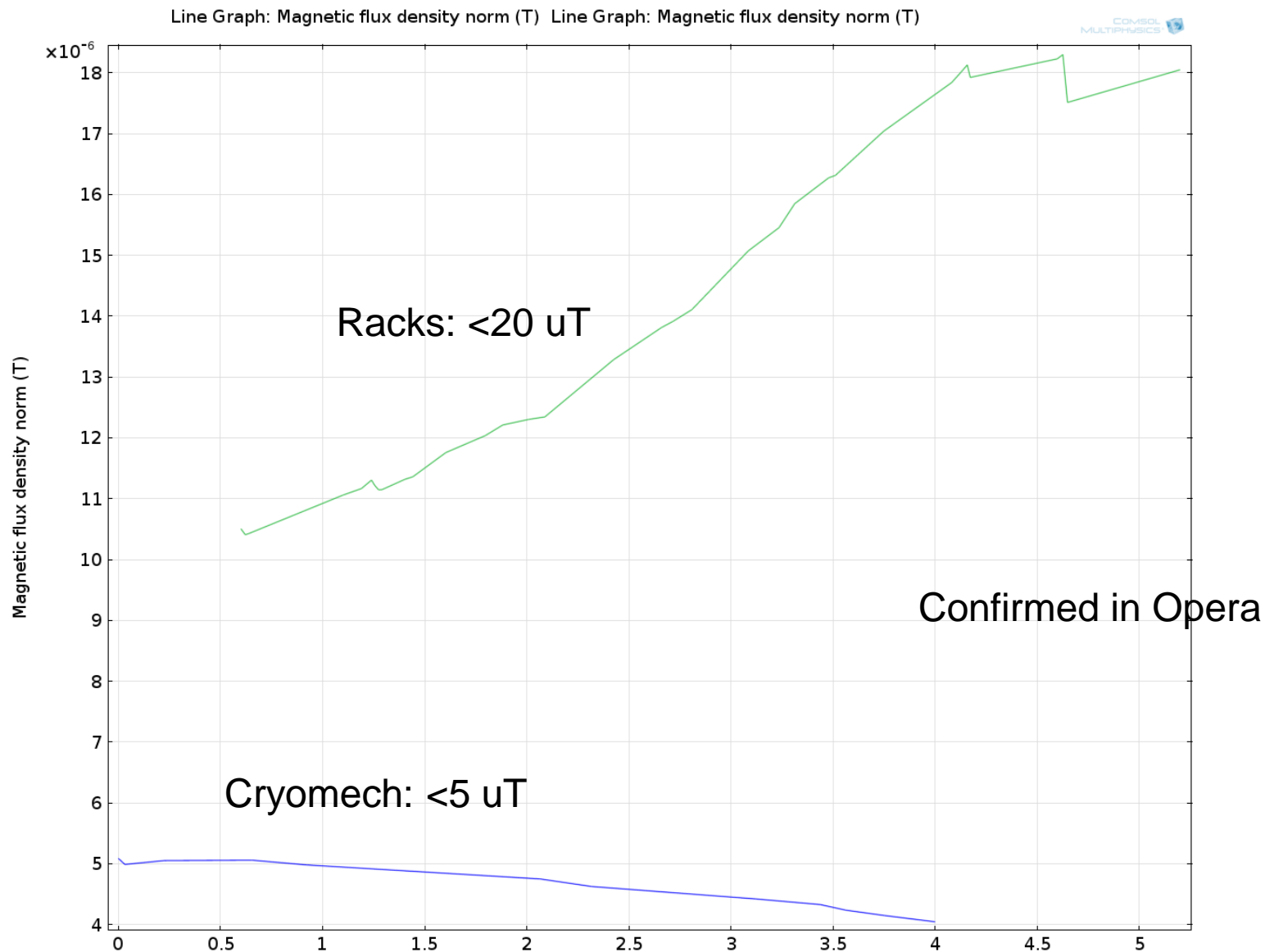
Iron MICE Hall

27/Dec/2012 13:00:00

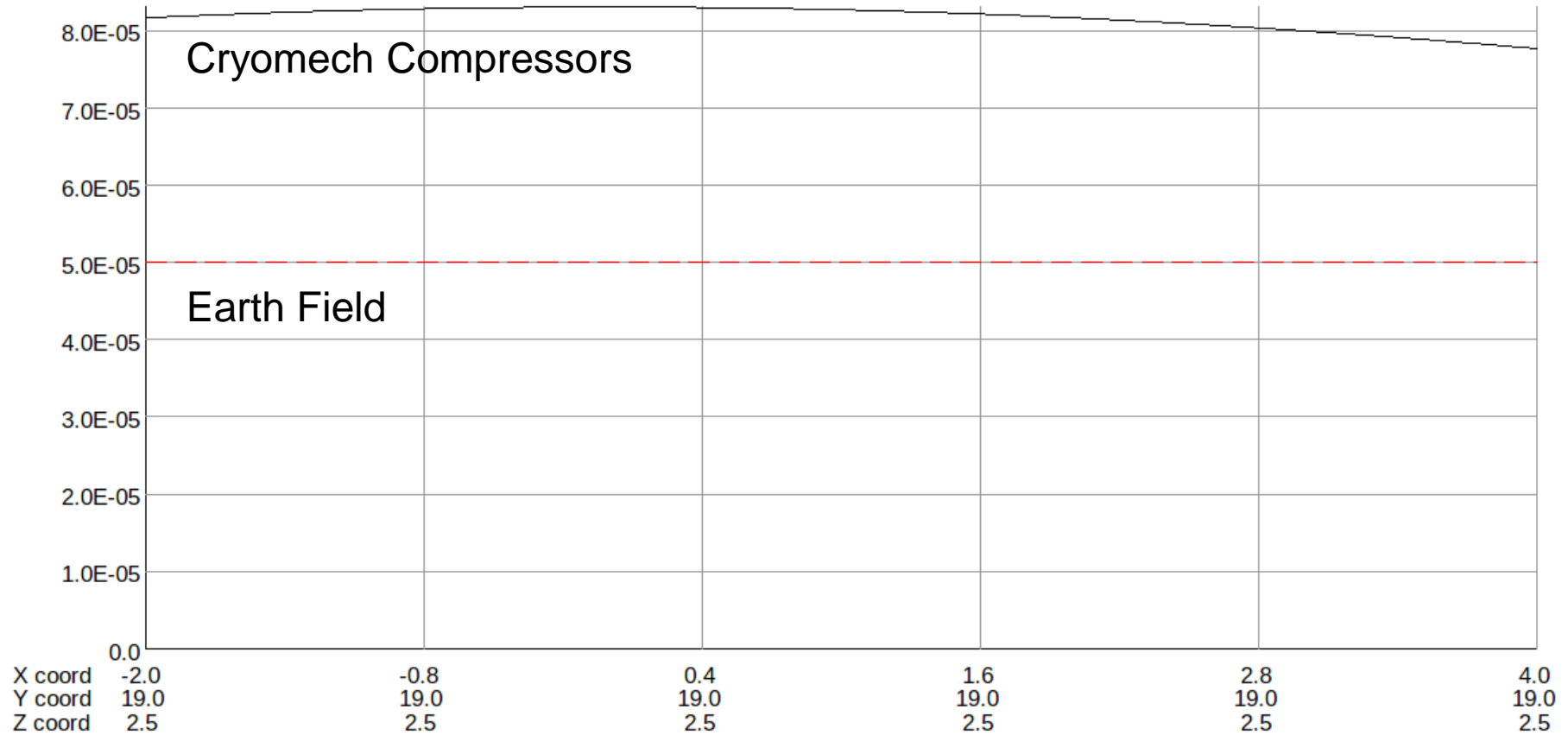


NMF – COMSOL Model



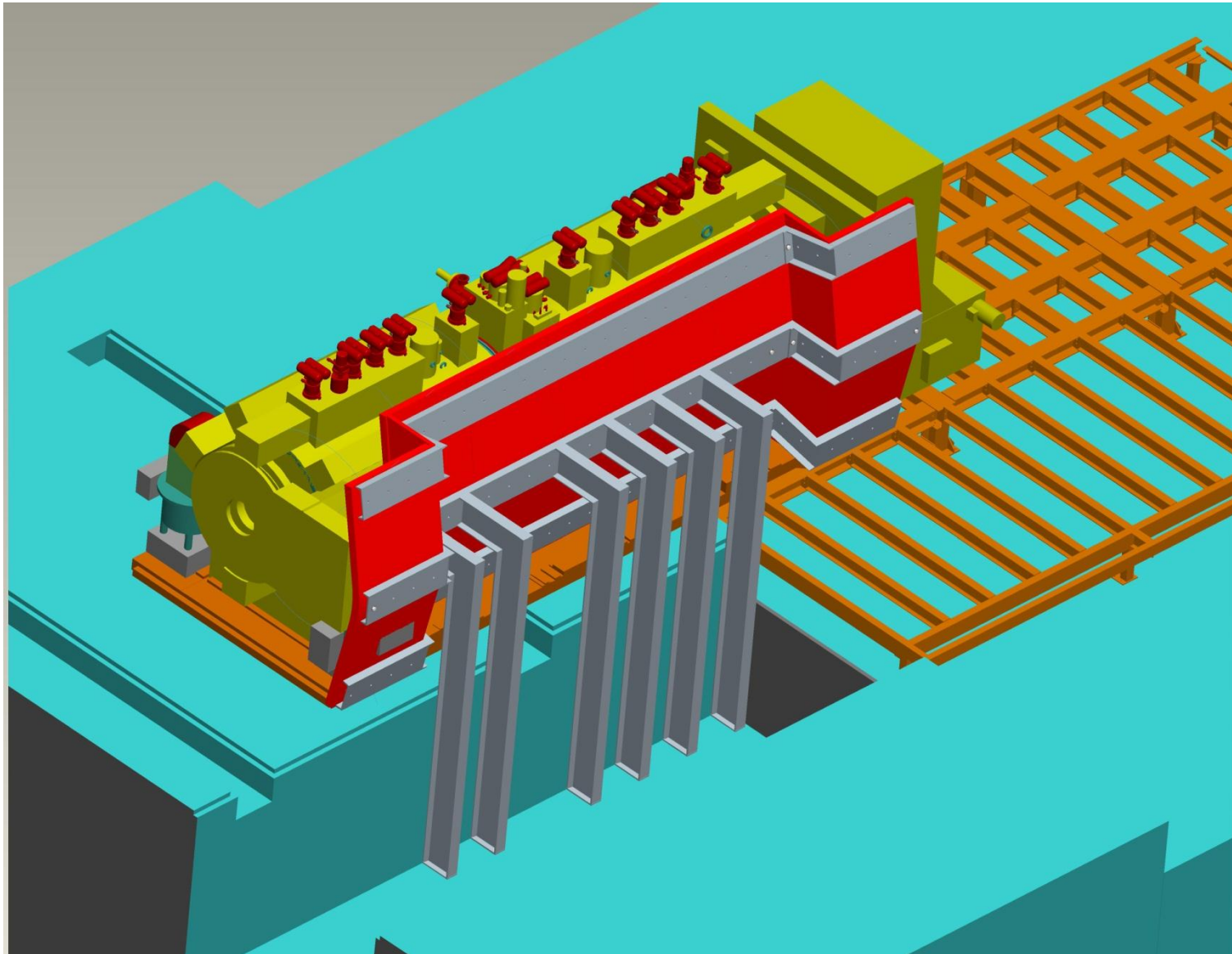


Comparison No Iron (Biot-Savart)



Step IV, 240 MeV Solenoid Mode

Engineering Update

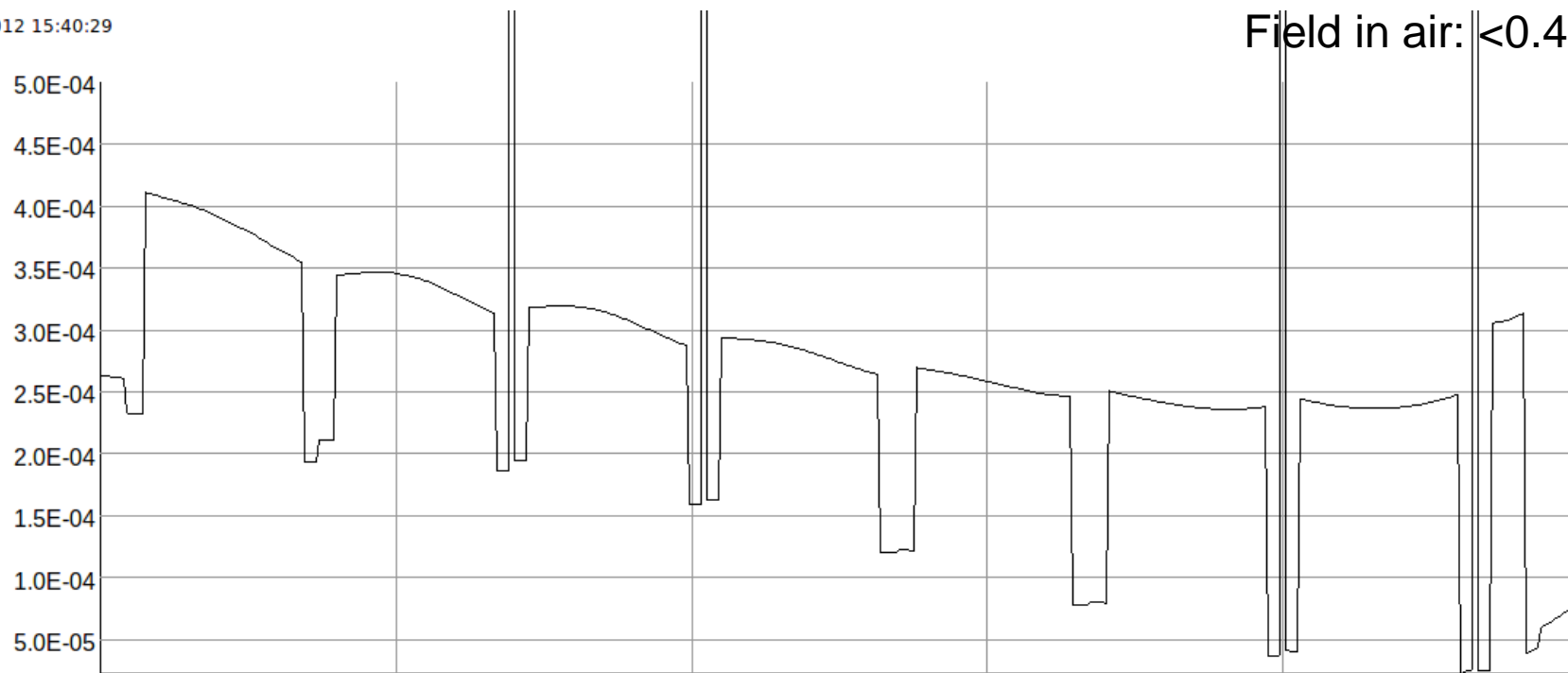


- Opera hall model: reason for field in Cryomech Compressor?
- Fields real?
- BH curves in Opera
 - Not meant for these field levels
 - μ_r too large for small H/B?
- To explore this: much larger effort required
 - measure BH curves for small H/B
 - far from trivial
 - Include in Opera (maybe even less trivial)
- Practical approach?
 - Look at field in air without iron
 - If field is comparable or less than earth's magnetic field: no issue

Opera Hall Model 35/36

Field in iron: >5mT
Field in air: <0.4 mT

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X coord	-6300.0	-6300.0	-6300.0	-6300.0	-6300.0	-6300.0	-6300.0
Y coord	-500.0	-500.0	-500.0	-500.0	-500.0	-500.0	-500.0
Z coord	600.0	1520.0	2440.0	3360.0	4280.0	5200.0	

Component: BMOD, from buffer: Line, Integral = 1.68210864215548

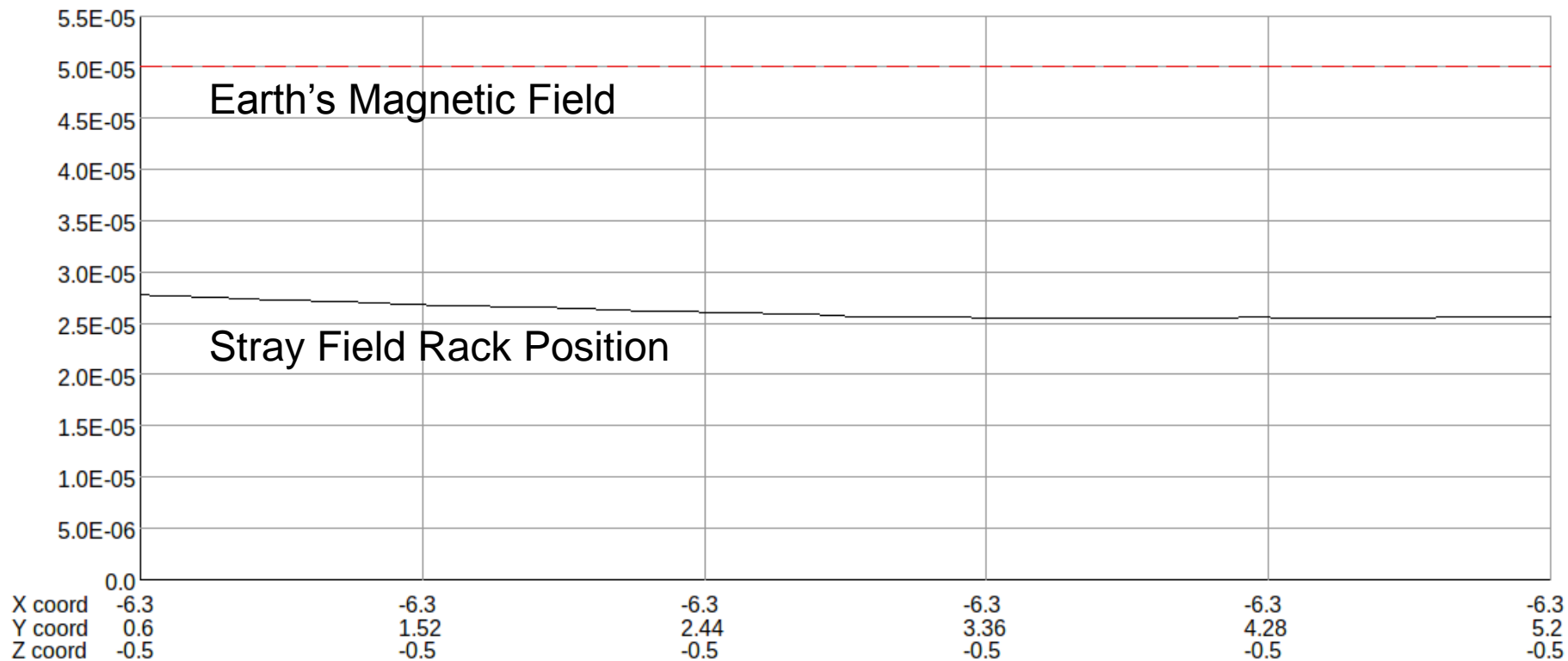
Position: Rack steel NSW
Step IV, Solenoid Mode, 240 MeV

Requires explaining



My Simulation

tec/2012 15:49:55



Field at same position, with shield
No racks