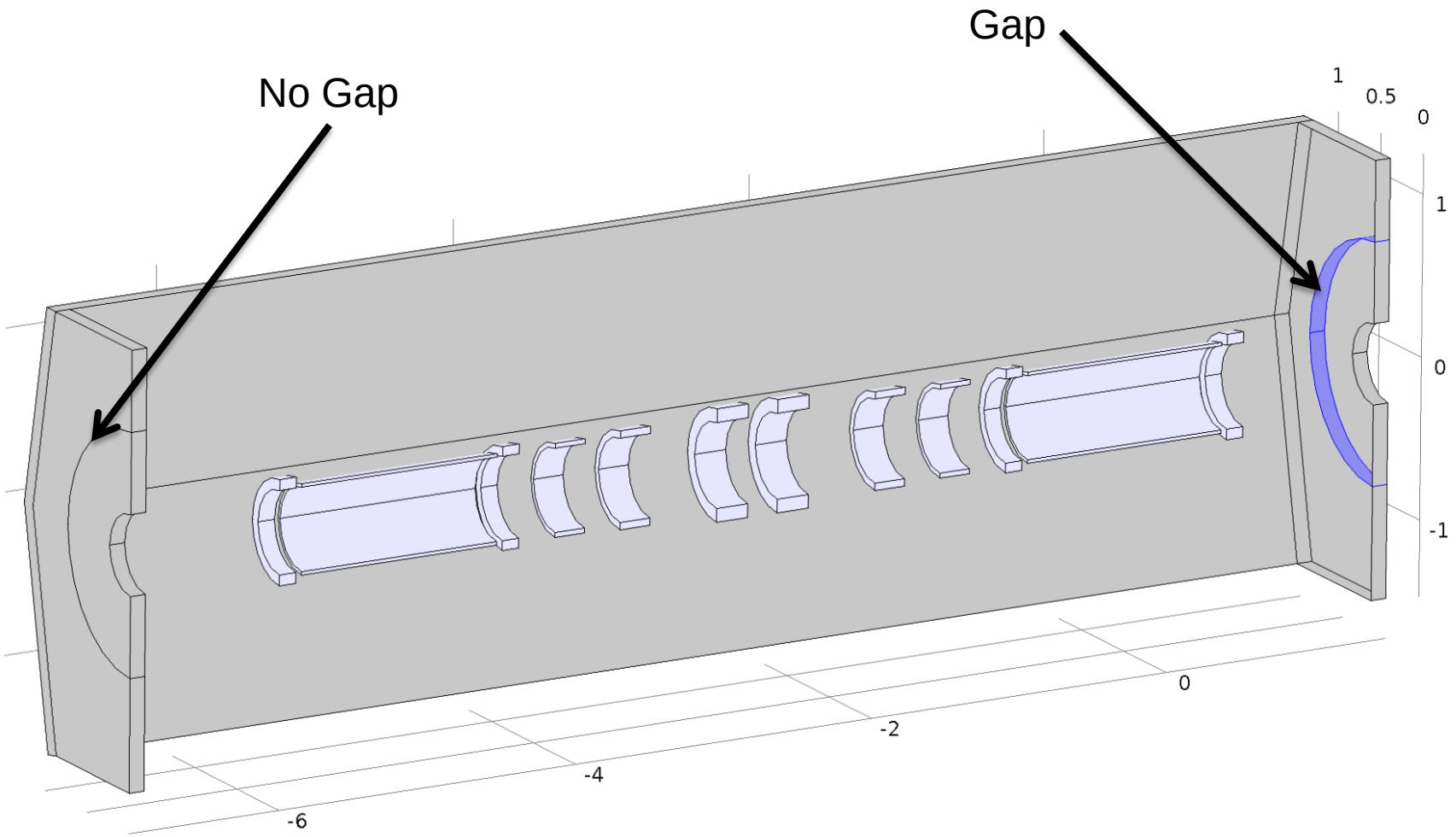
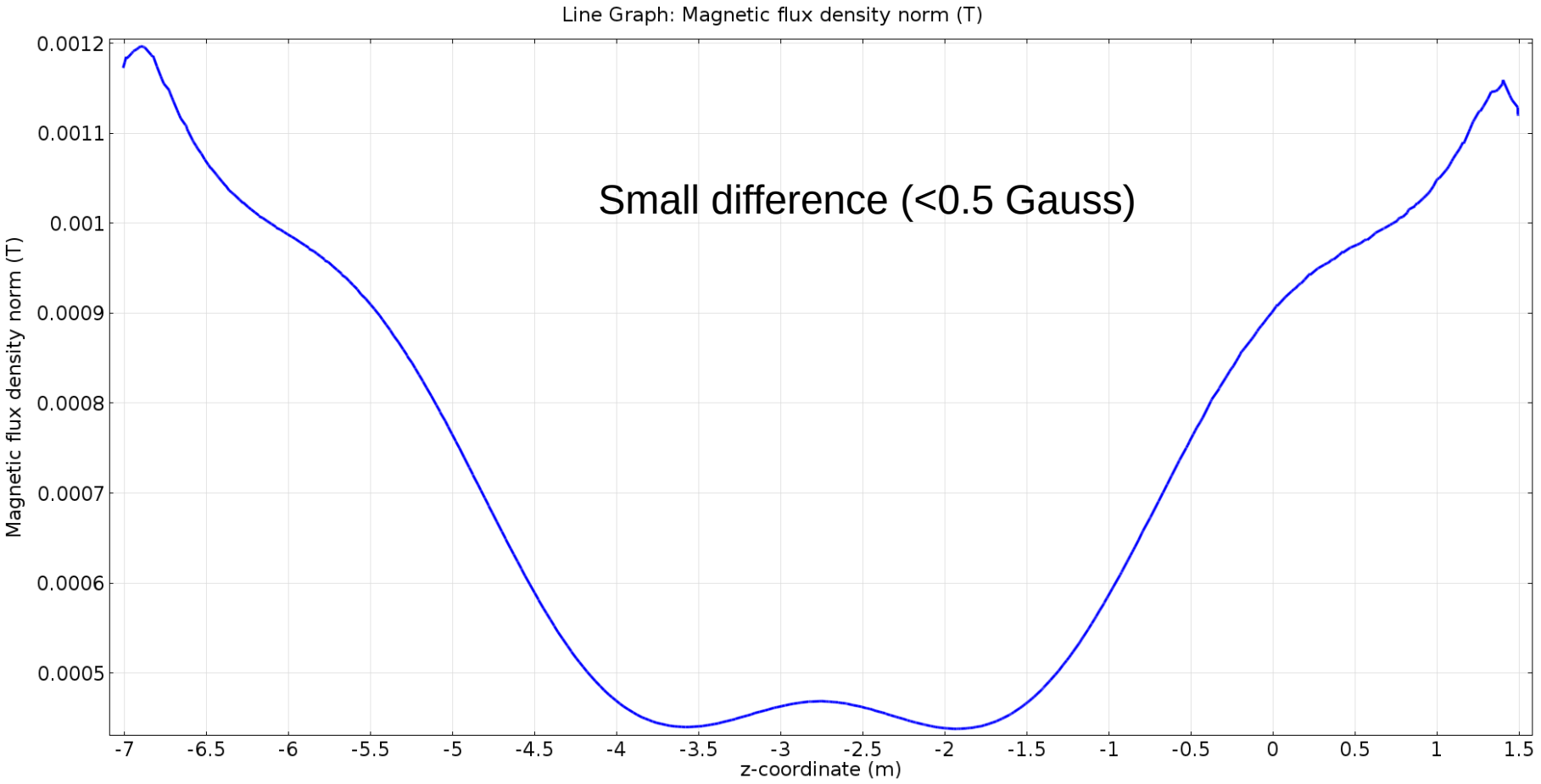
MICE

Holger Witte
Brookhaven National Laboratory
Advanced Accelerator Group

Gap Virostek Shield

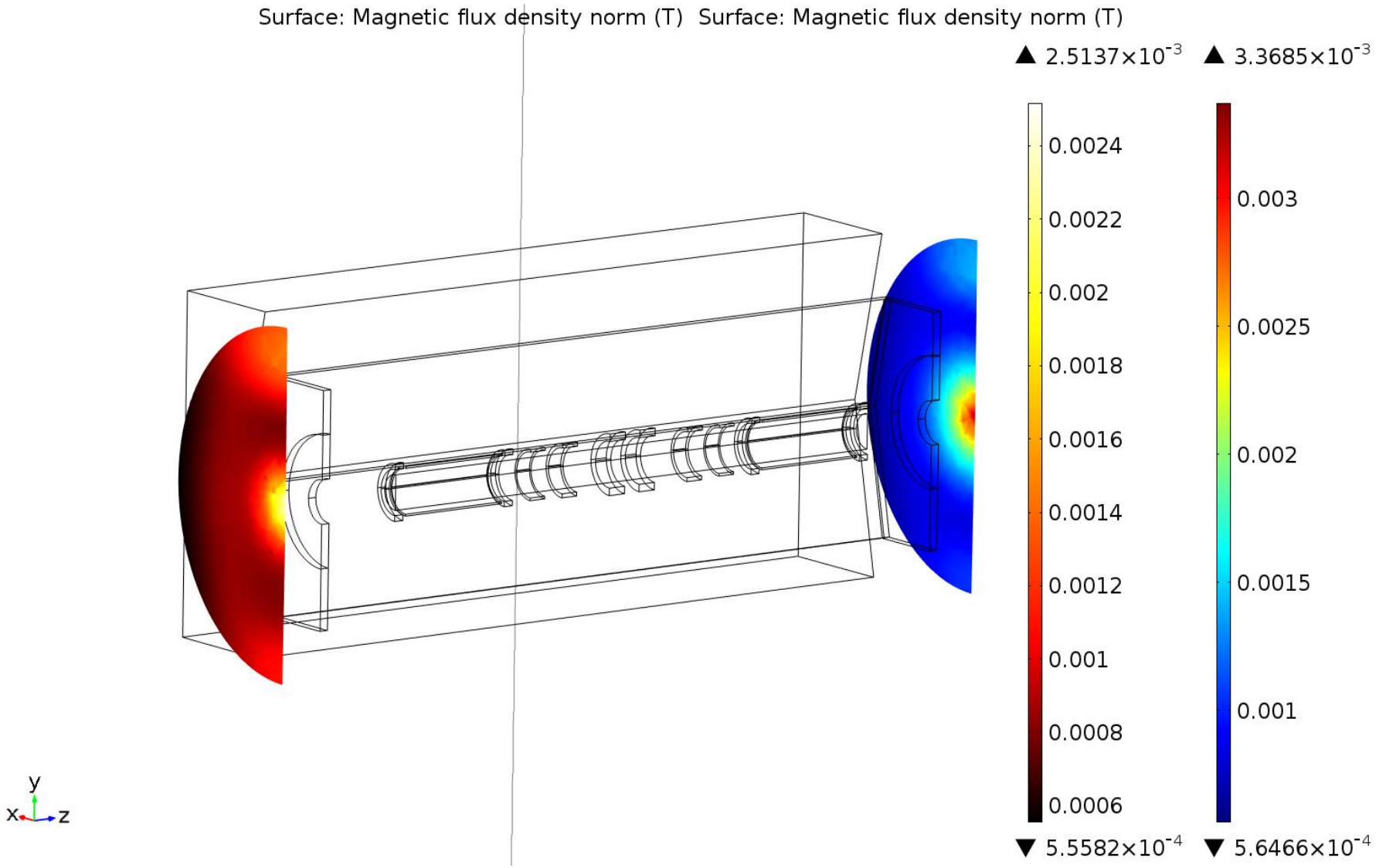


Field R=1.5 m

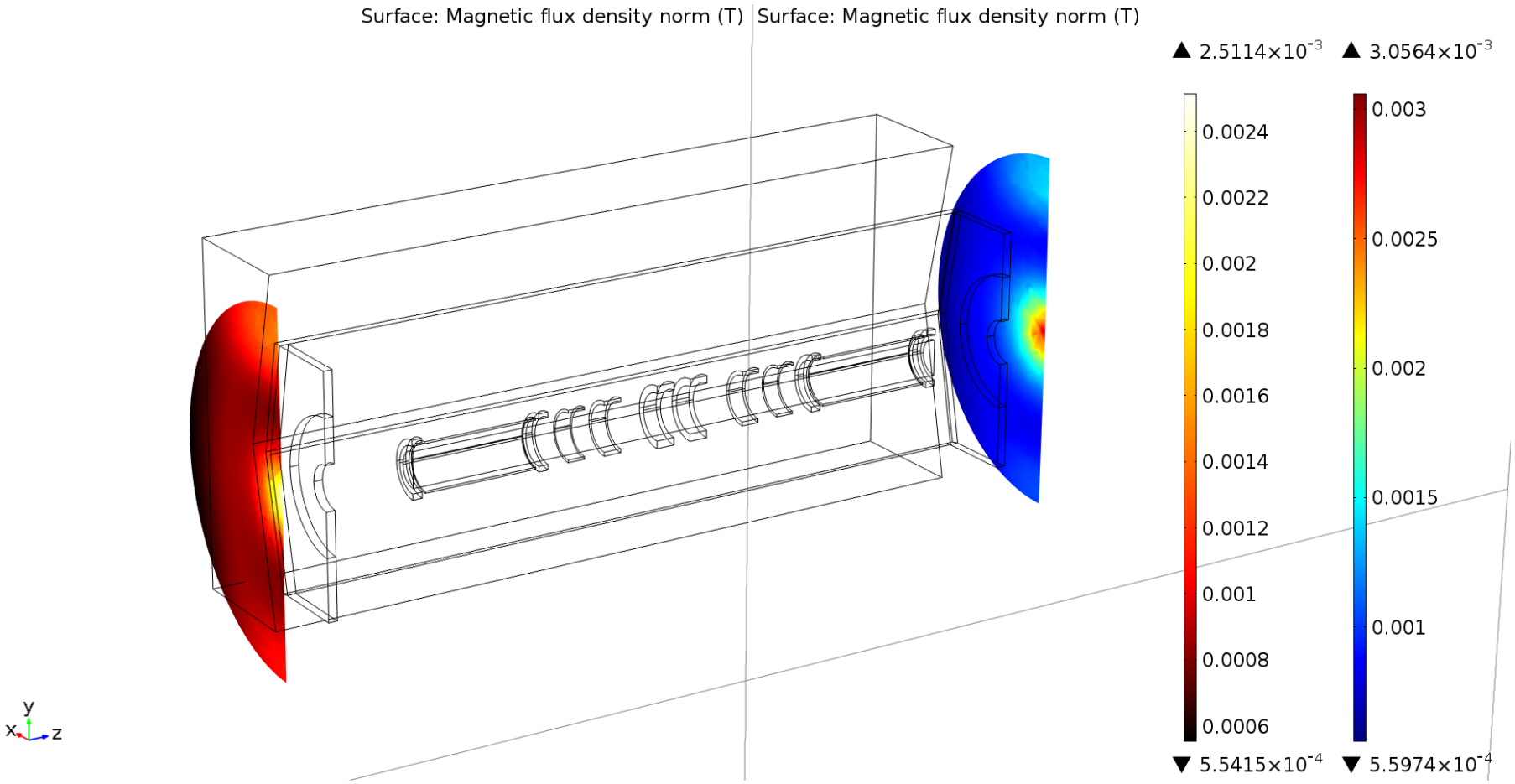


2 mm gap

Gap: 2 mm

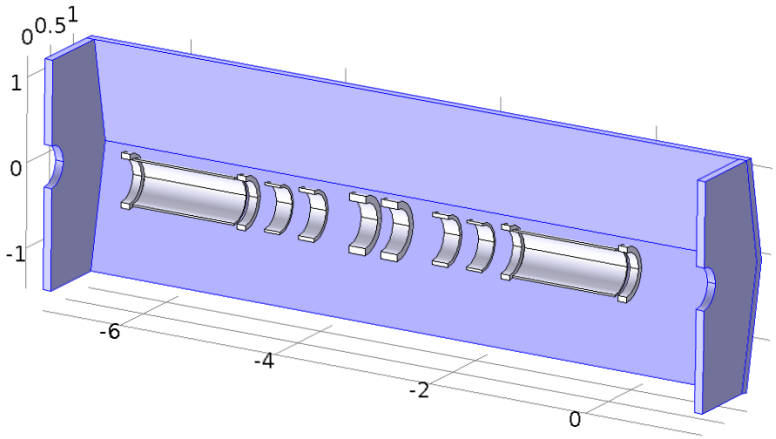

Surface: Magnetic flux density norm (T)
Surface: Magnetic flux density norm (T)
▲ 2.5137×10^-3
▲ 3.3685×10^-3
0.0024
0.0022
0.002
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.003
0.0025
0.002
0.0015
0.001
▼ 5.5582×10^-4
▼ 5.6466×10^-4
y
x
z

Gap: 1 mm


Surface: Magnetic flux density norm (T)
Surface: Magnetic flux density norm (T)
▲ 2.5114×10^-3
▲ 3.0564×10^-3
0.0024
0.0022
0.002
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.003
0.0025
0.002
0.0015
0.001
▼ 5.5415×10^-4
▼ 5.5974×10^-4
y
x
z

Forces on Coils

- Step IV
  - 240 MeV Flip
  - 240 MeV Solenoid
- PRY ‘light’
  - Height reduced by 200 mm on one side (top)
- Forces
  - No net horizontal force due to symmetry reasons
- Method: Maxwell stress tensor



Forces

Vertical Forces

	FC	M1	M1	E1	Center	E2
240 MeV Flip	-192	2340	1894	-1140	366	2452
240 MeV Sol	-642	582	672	-980	380	2450
240 MeV Flip Iron	-244	2286	1910	-1236	226	2416
240 MeV Sol Iron	-644	584	678	-1012	326	2430

Longitudinal Forces

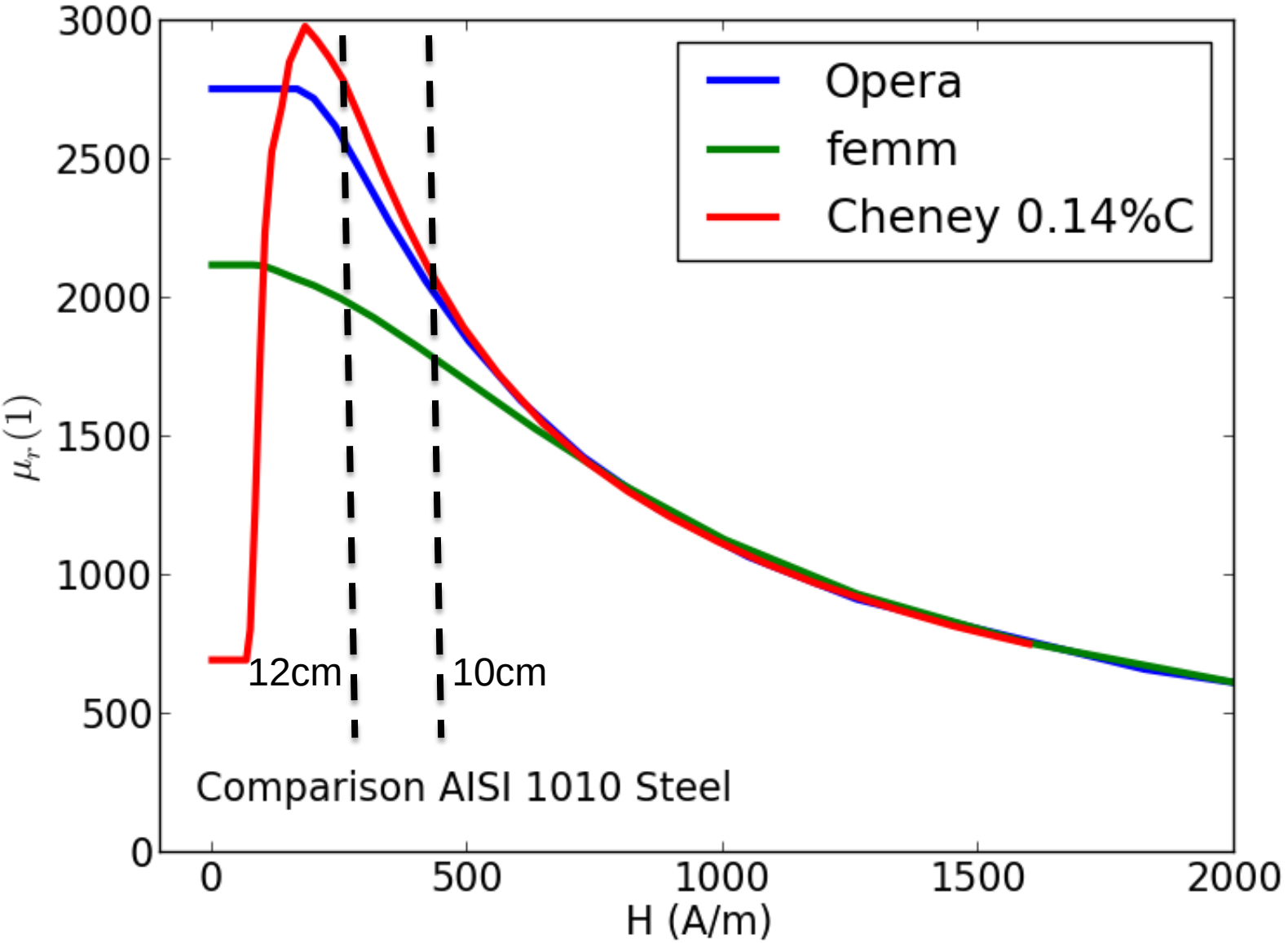
	FC	M1	M1	E1	Center	E2
240 MeV Flip	-3120138	-173582	-41260	-825222	-22034	1376086
240 MeV Sol	602814	-8436	-90834	-1003108	-107532	1375458
240 MeV Flip Iron	-3140296	-178038	-42670	-825900	-21886	1374424
240 MeV Sol Iron	603188	-8762	-91544	-1005390	-114202	1372800

All forces in Newton

Performance – Risks

- Material Properties
  - Magnetization curve AISI 1010
- Mitigation strategies
  - Margin (increase shield thickness 10→12 cm)
  - Different material

AISI 1010: μ_r



Sensitivity Study