

# Update on the Shields:

## Magnetic Shielding Validation and Loads on the Thermal Shield

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ENGINEERING  
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# Magnetic Shield

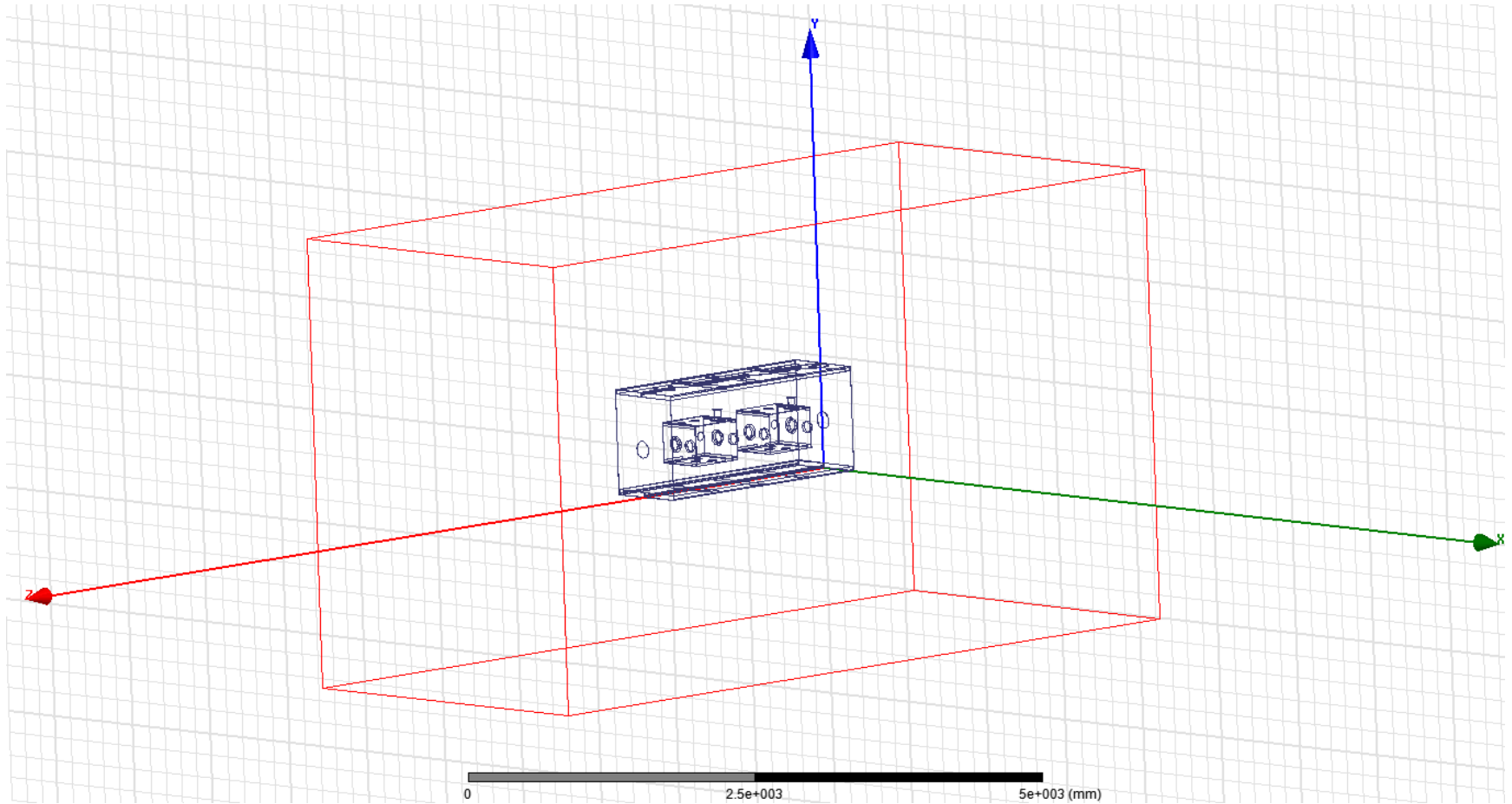
# Goal

- Validation of previous magnetic calculations

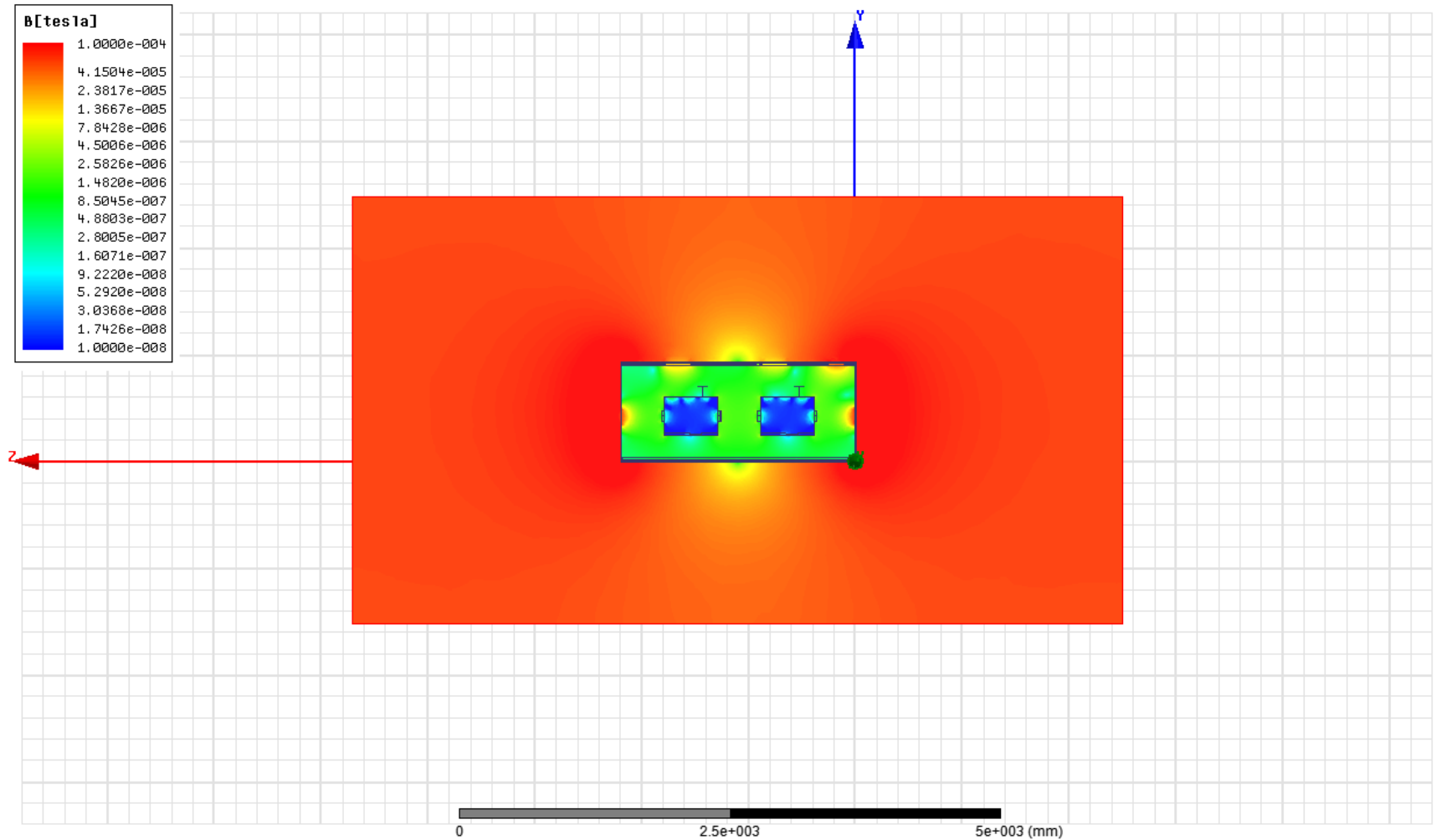
## Info:

- Mu-metal for external shield
- Cryophy for internal (B-H provided by Nik)
- About 60 uT of external field aligned with beam axis (applied through  $H = 46 \text{ A/m}$ )
- Vacuum region around CM with {160 %, 150 %, 110 %} offset per axis

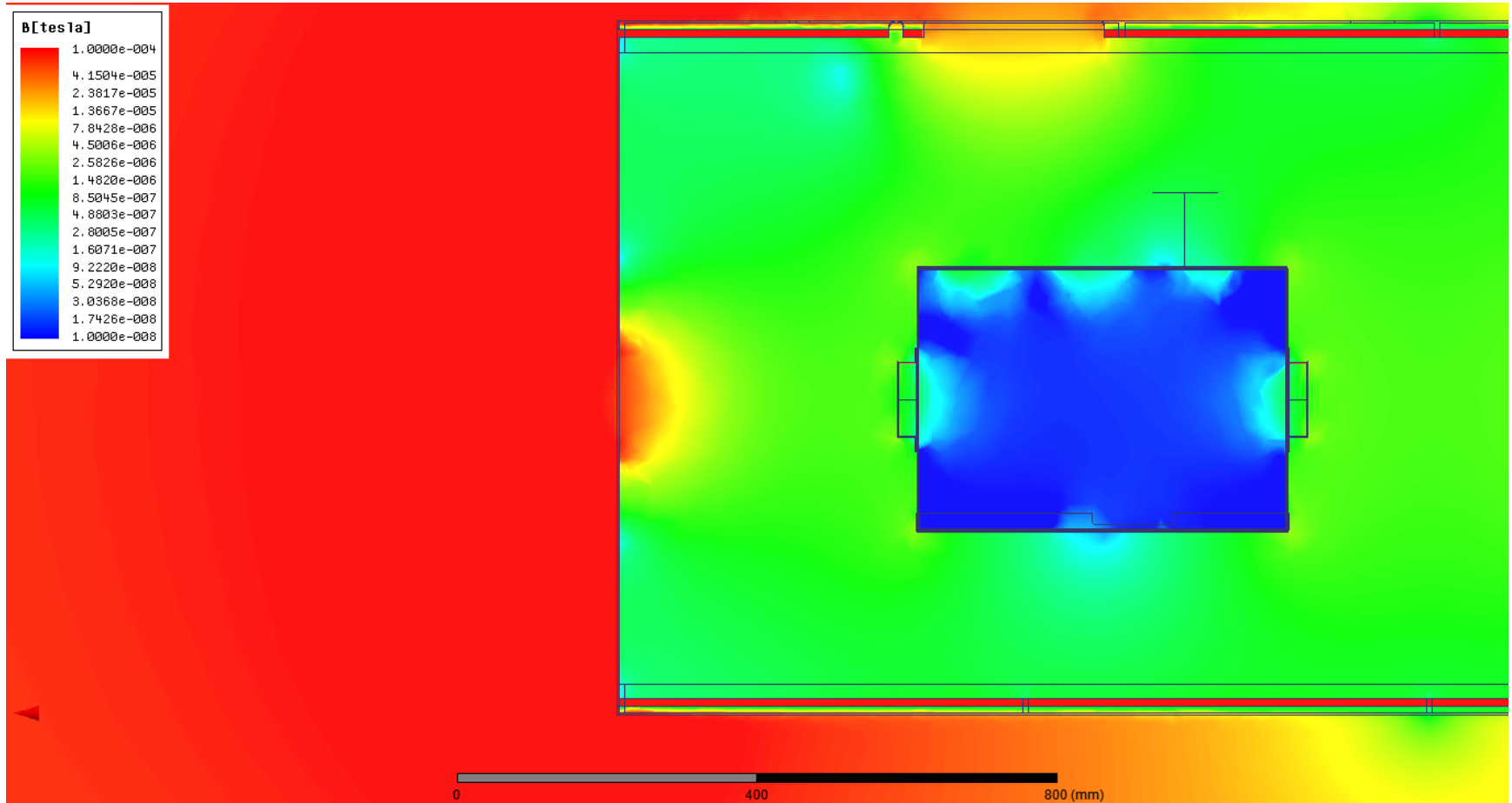
# Model



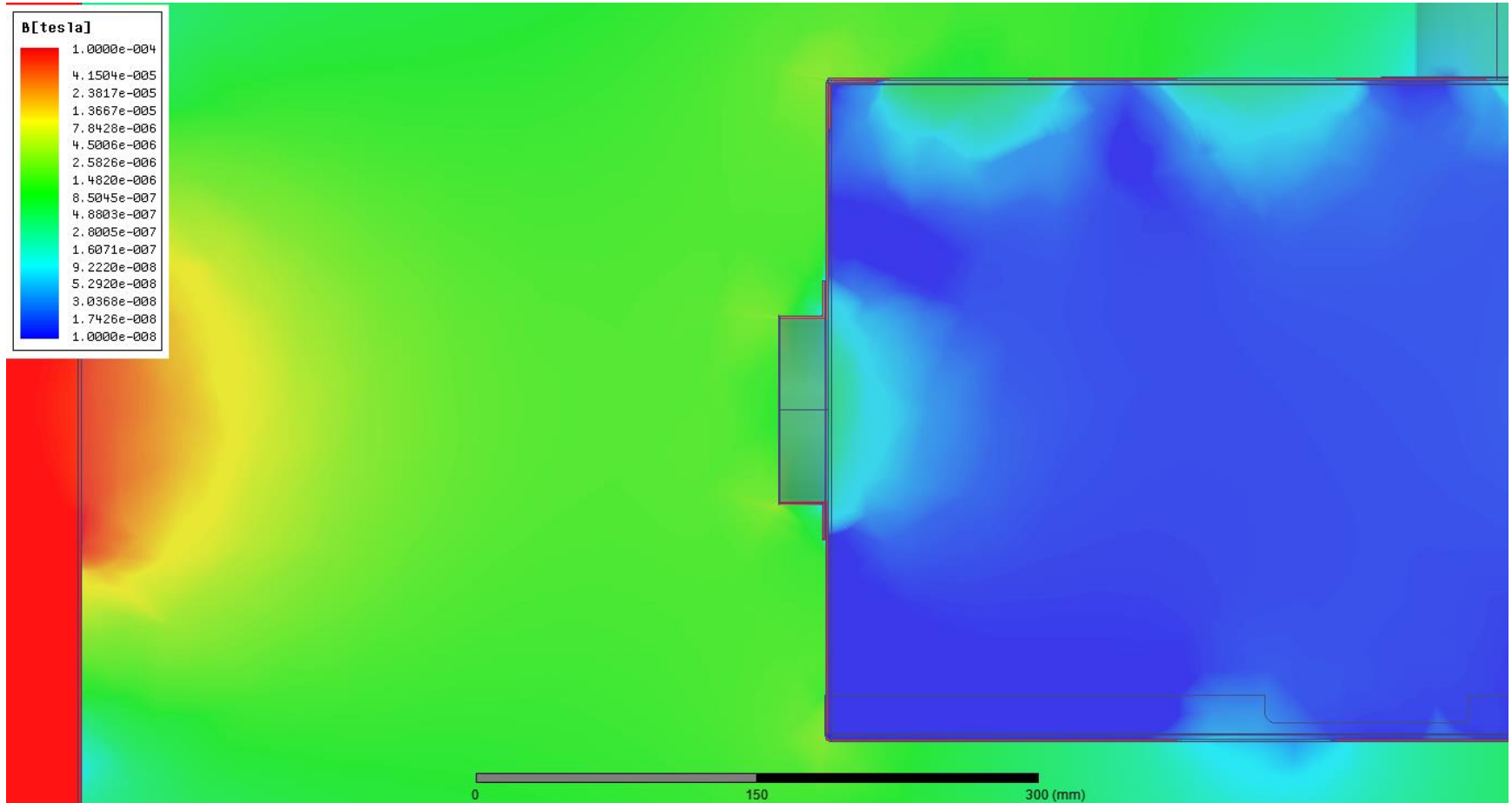
# Results



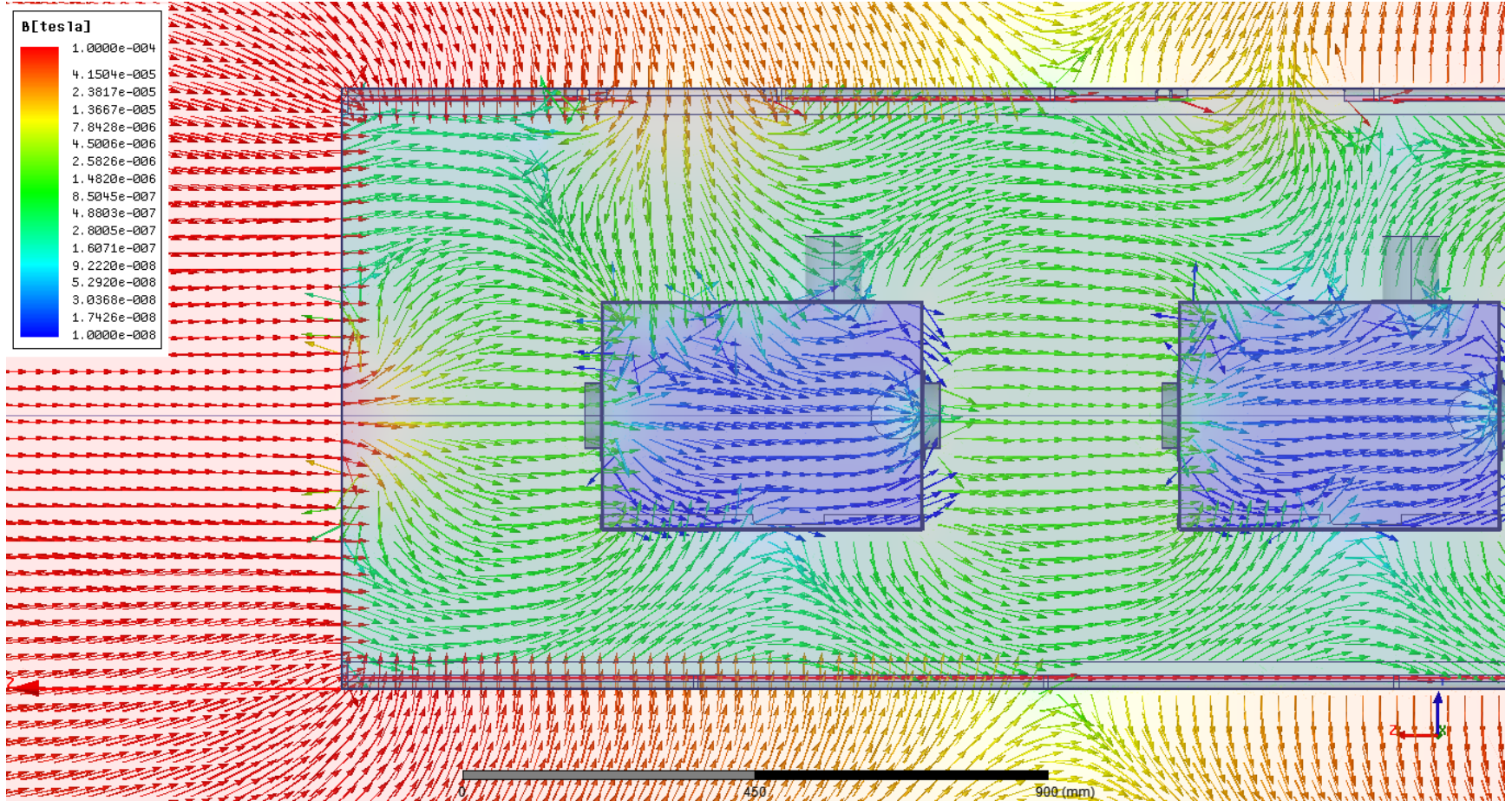
# Results



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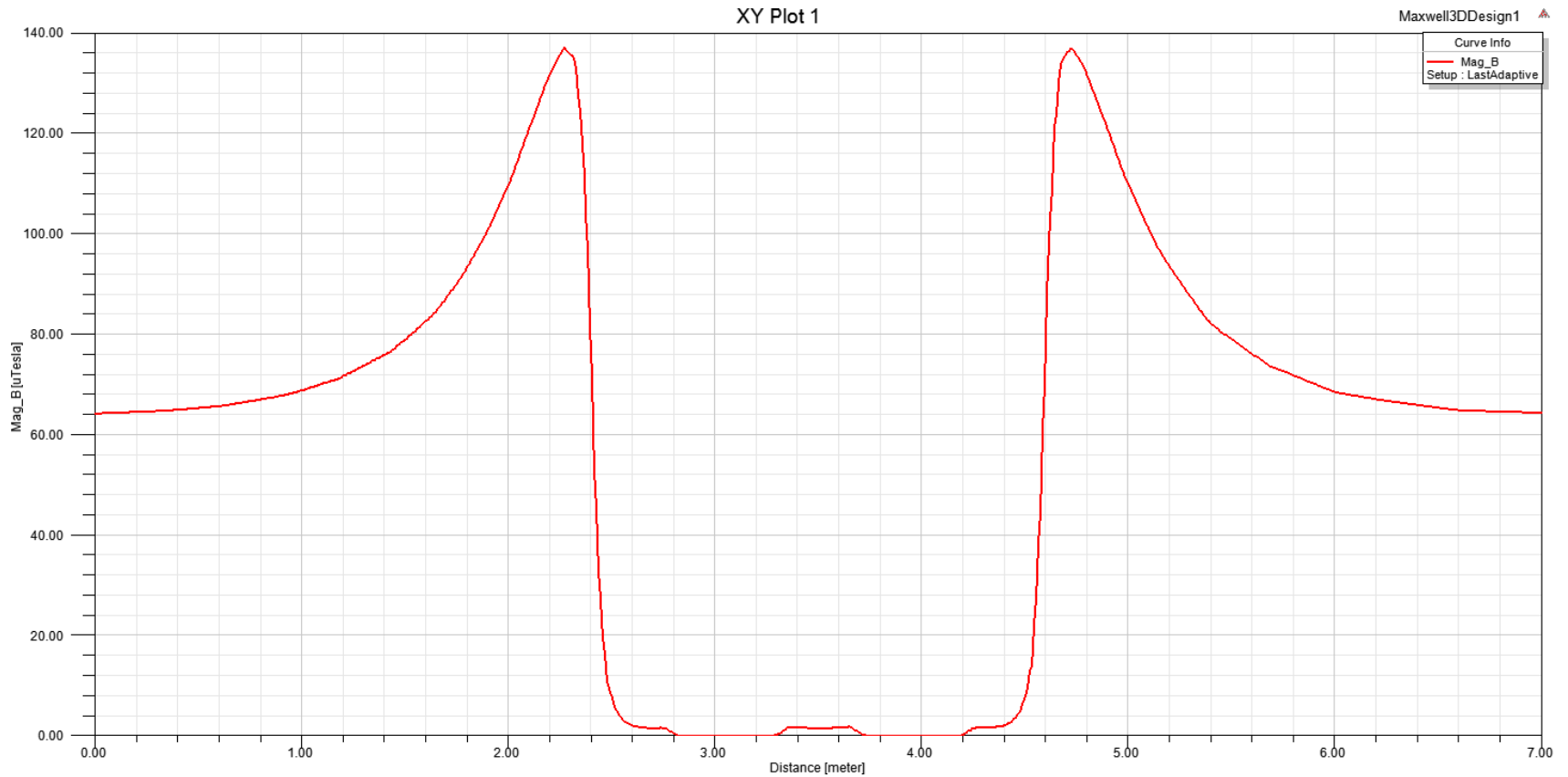


# Results





# Results: B field along beam axis



# Results

- Field inside warm shield about 1.5  $\mu\text{T}$
- Field inside cold shield about 0.03  $\mu\text{T}$

# Thermal Shield

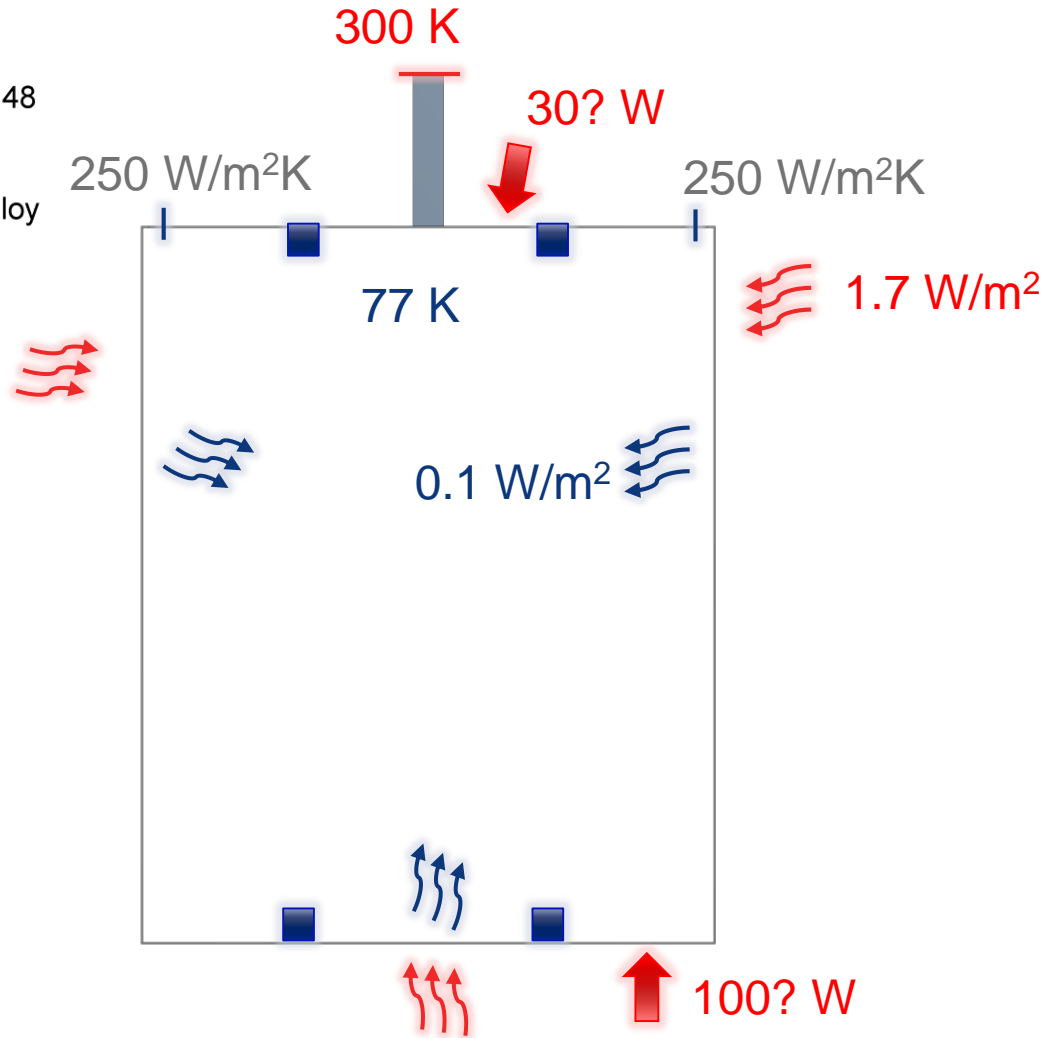


# Loads and Boundary Conditions

Figure

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Al6061\_t6  
Titanium Alloy



# Loads and Boundary Conditions

- 300 K external (support edge)
- 77 K at the intercepts locations (real T between 50 and 70 K)
- 100-150 ? W to shield from HOM, pickup etc...\*
- 0.1 W/m<sup>2</sup> radiative heat to the tank \*
- 1.7 W/m<sup>2</sup> radiative heat through the MLI (1.5x factor from \*\*)
- 250 W/m<sup>2</sup>K thermal conductance (i.e. localized thermal resistance at contact location) \*\*\*

\*from Fede's table

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\*MLI (also implemented with an Ansys macro as T dependent, but it's a secondary effect):

<http://arxiv.org/ftp/arxiv/papers/1501/1501.07154.pdf>

\*\*Conductance (derived with a sample area of  $0.00725^2\pi$  m<sup>2</sup>. **To be checked**):

<http://scitation.aip.org/content/aip/journal/rsi/83/3/10.1063/1.3697693>

# Preliminary Results

C: Al6061t6 - heat flux imposed #2

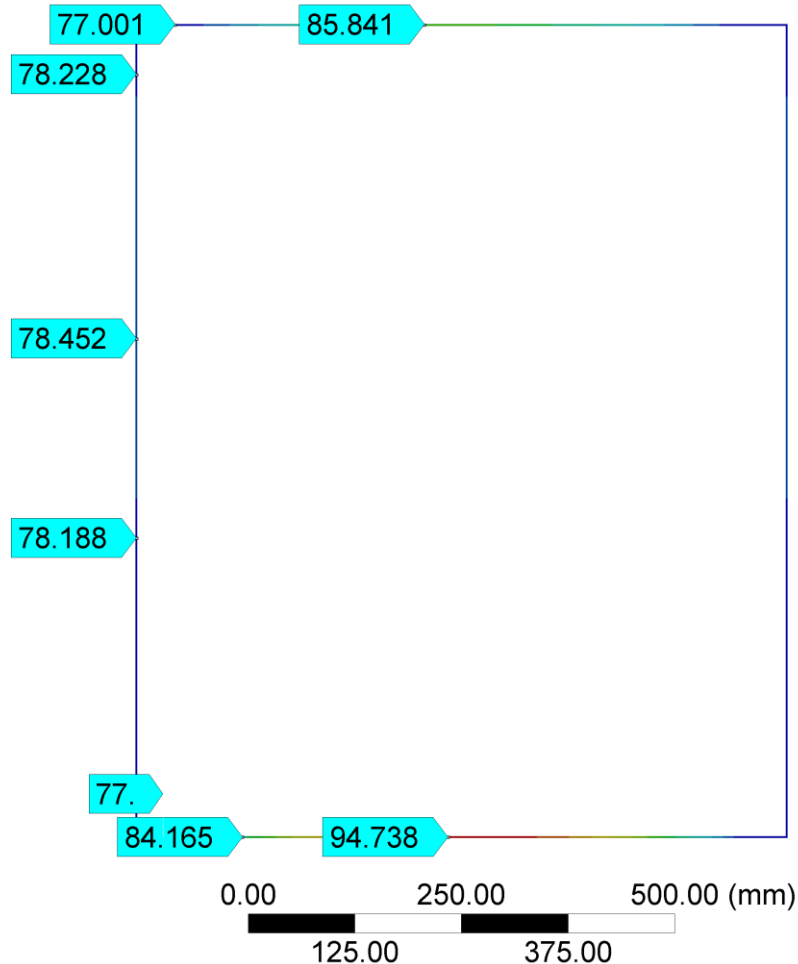
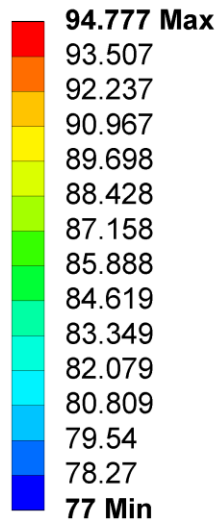
Figure

Type: Temperature

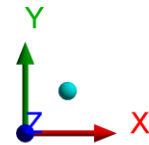
Unit: K

Time: 1

19/10/2015 09:07



Cold line (about 70 K)  
needed on both top  
and bottom





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