Target Simulation - More Realistic Geometry

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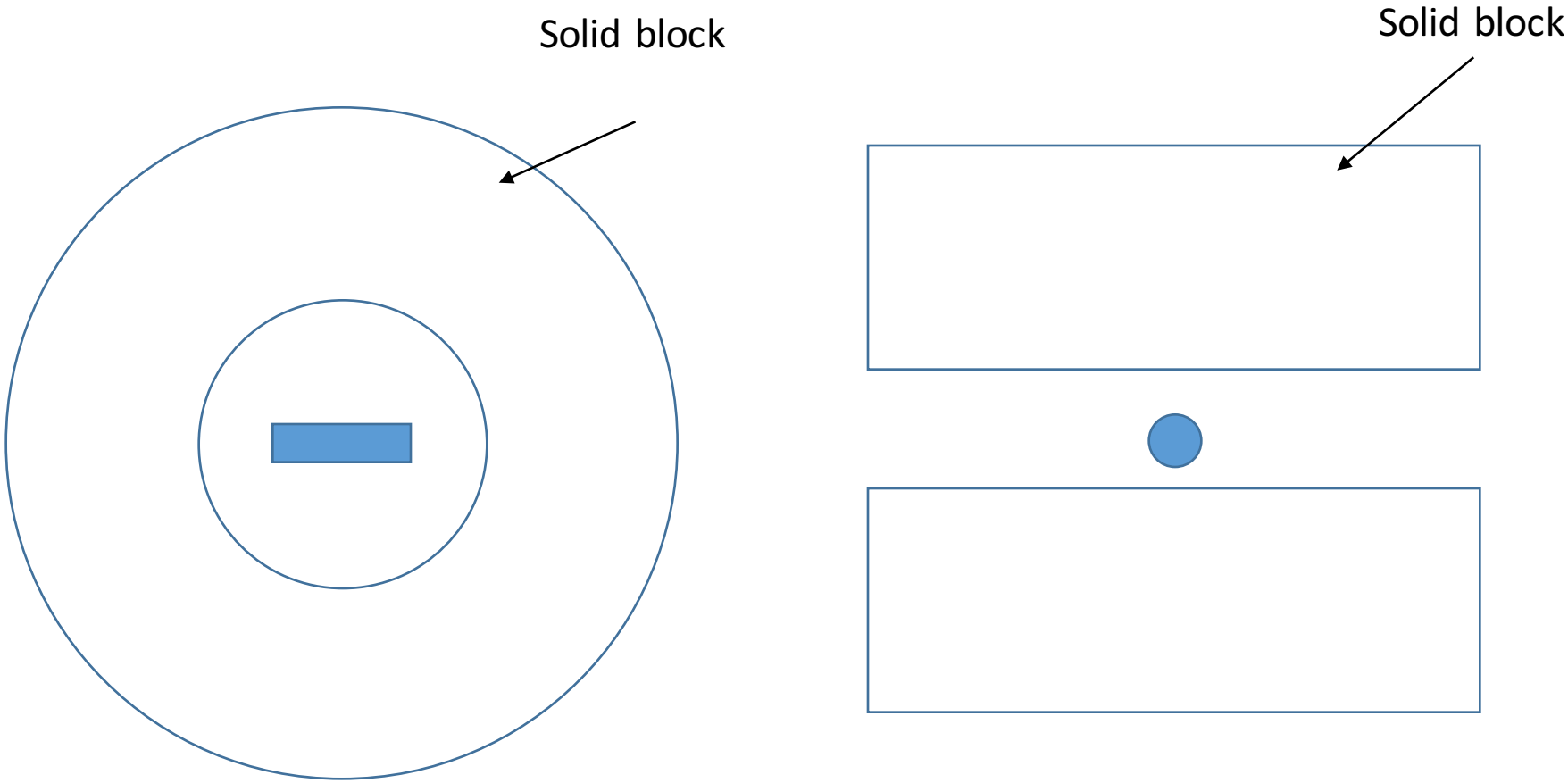
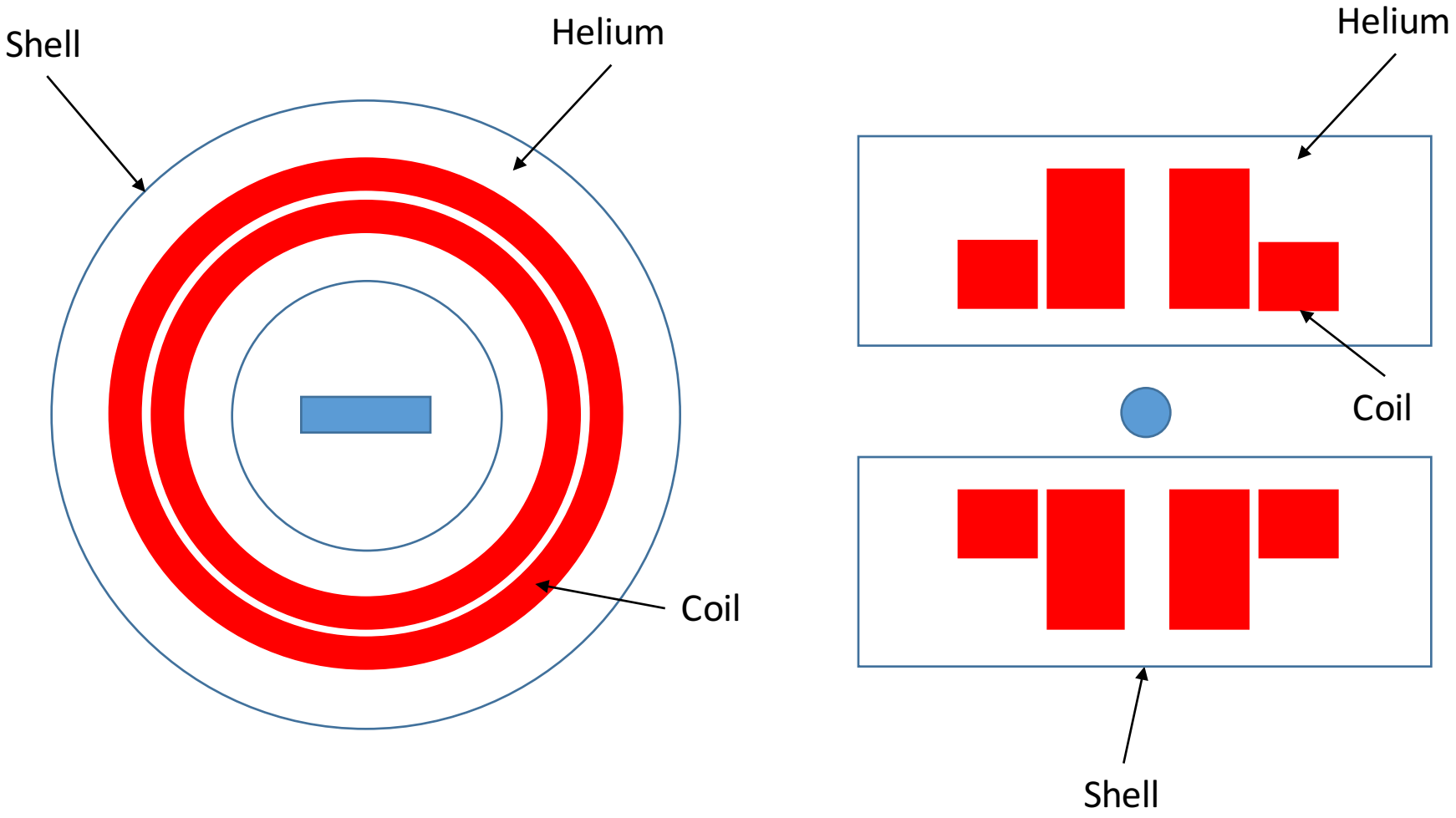
Simple Tube Geometry

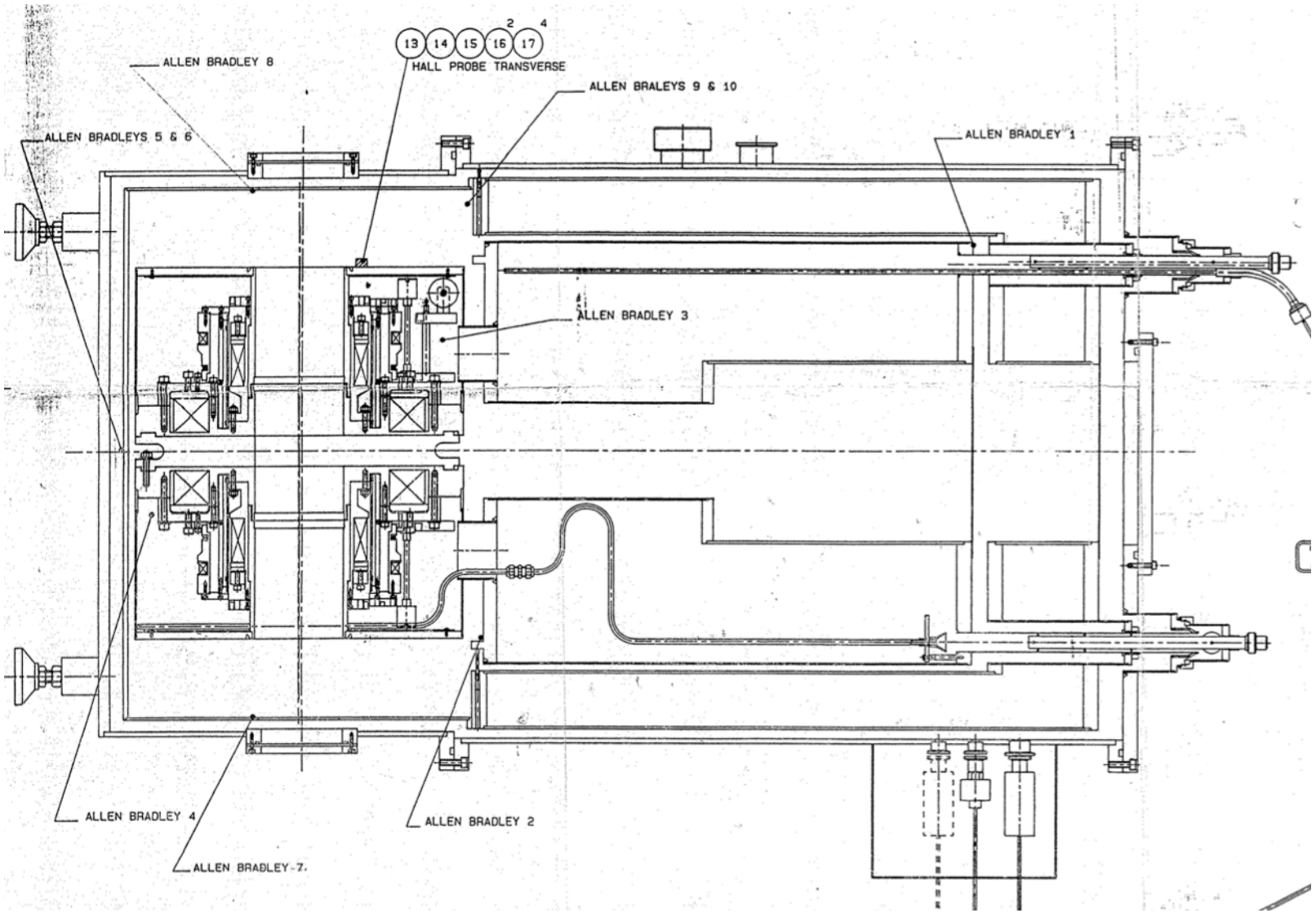


More realistic mass distribution

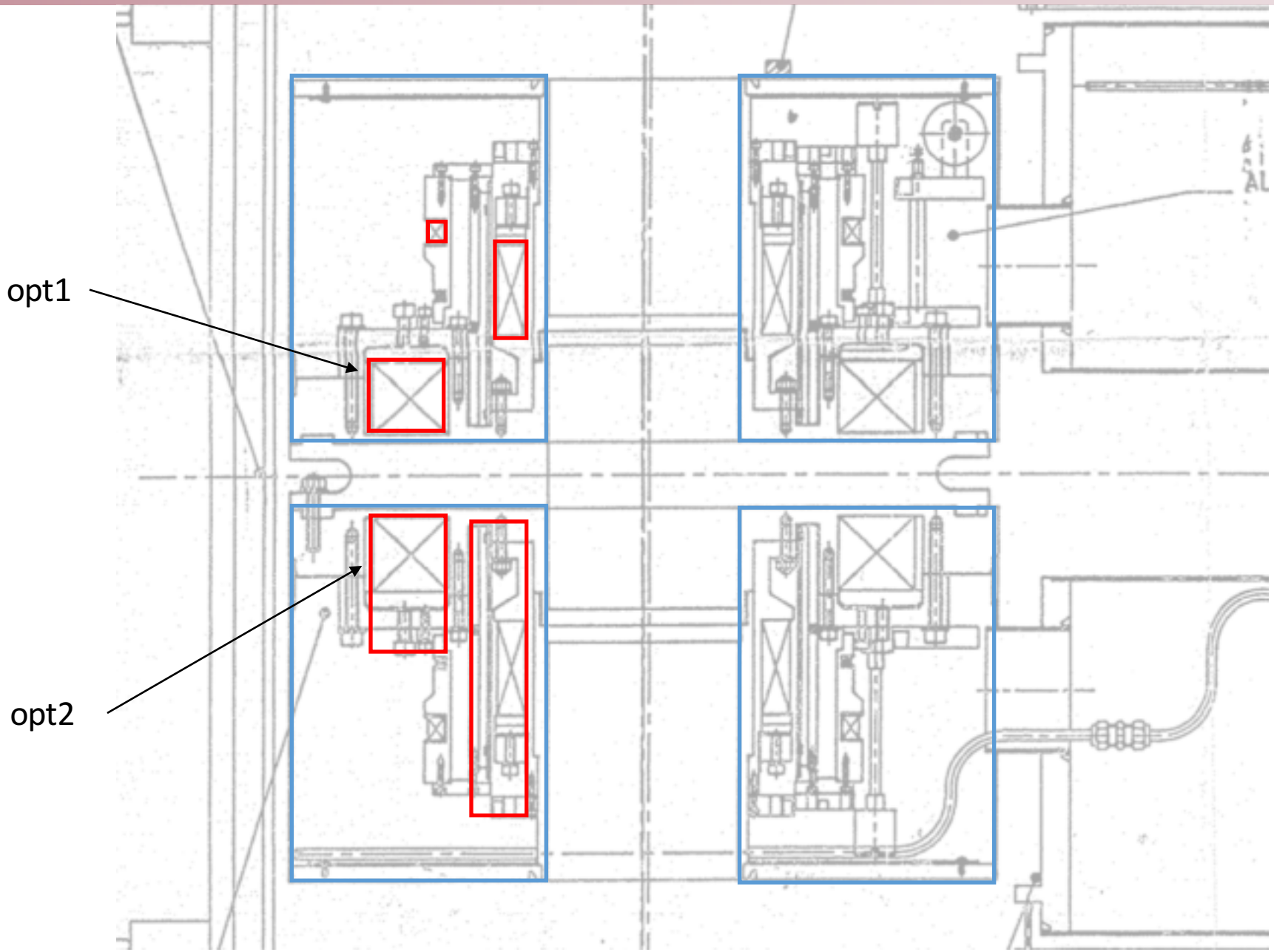


libraries: https://github.com/HaiwangYu/coresoftware/tree/TargetSim
analysis: https://github.com/HaiwangYu/TargetSim

E1039 target - Plot from Andi



E1039 - only coil or some of the support



BNL target - Plots from Dustin

The target cell: 3.5 cm long 2.5 cm in diameter

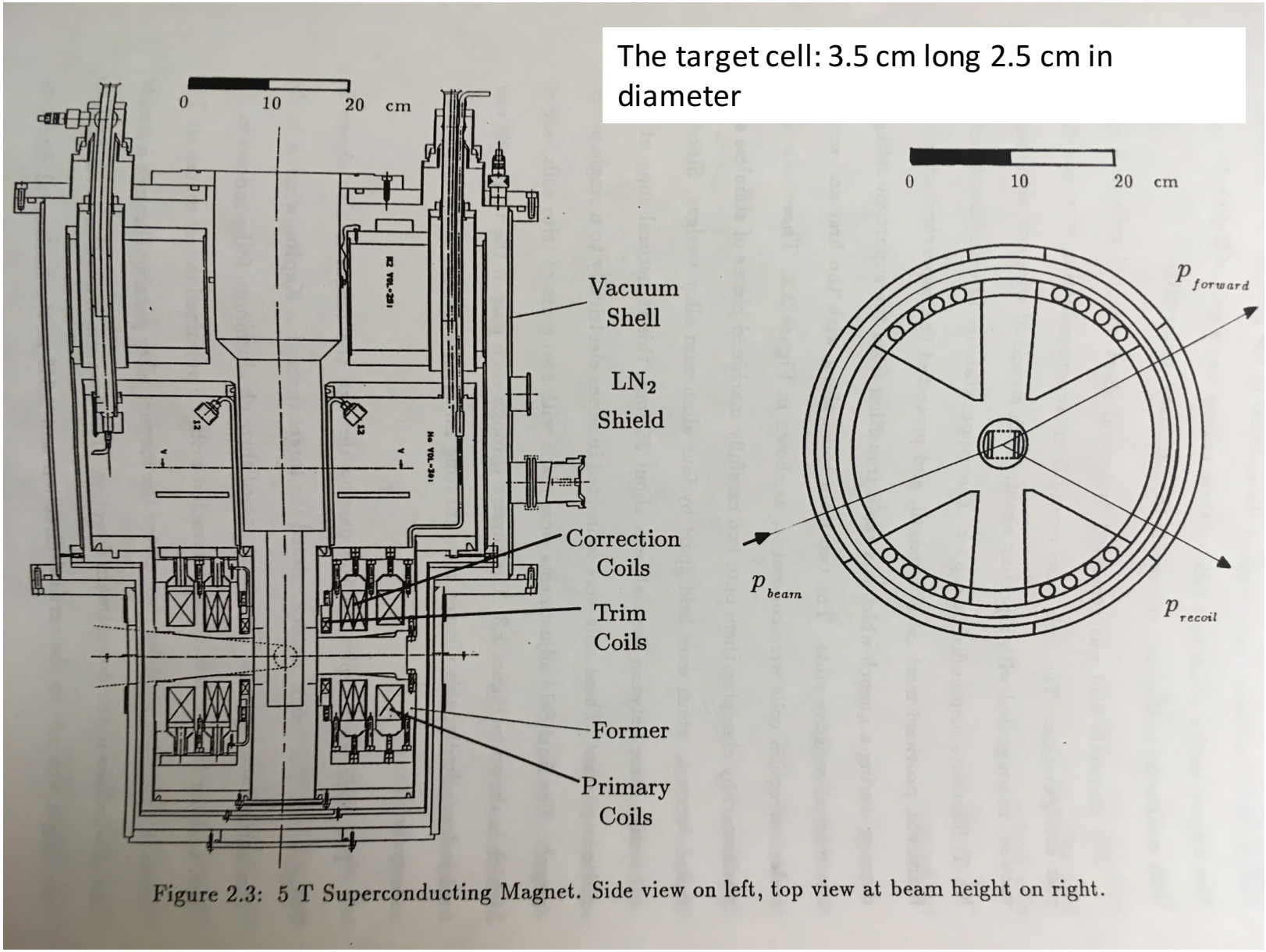
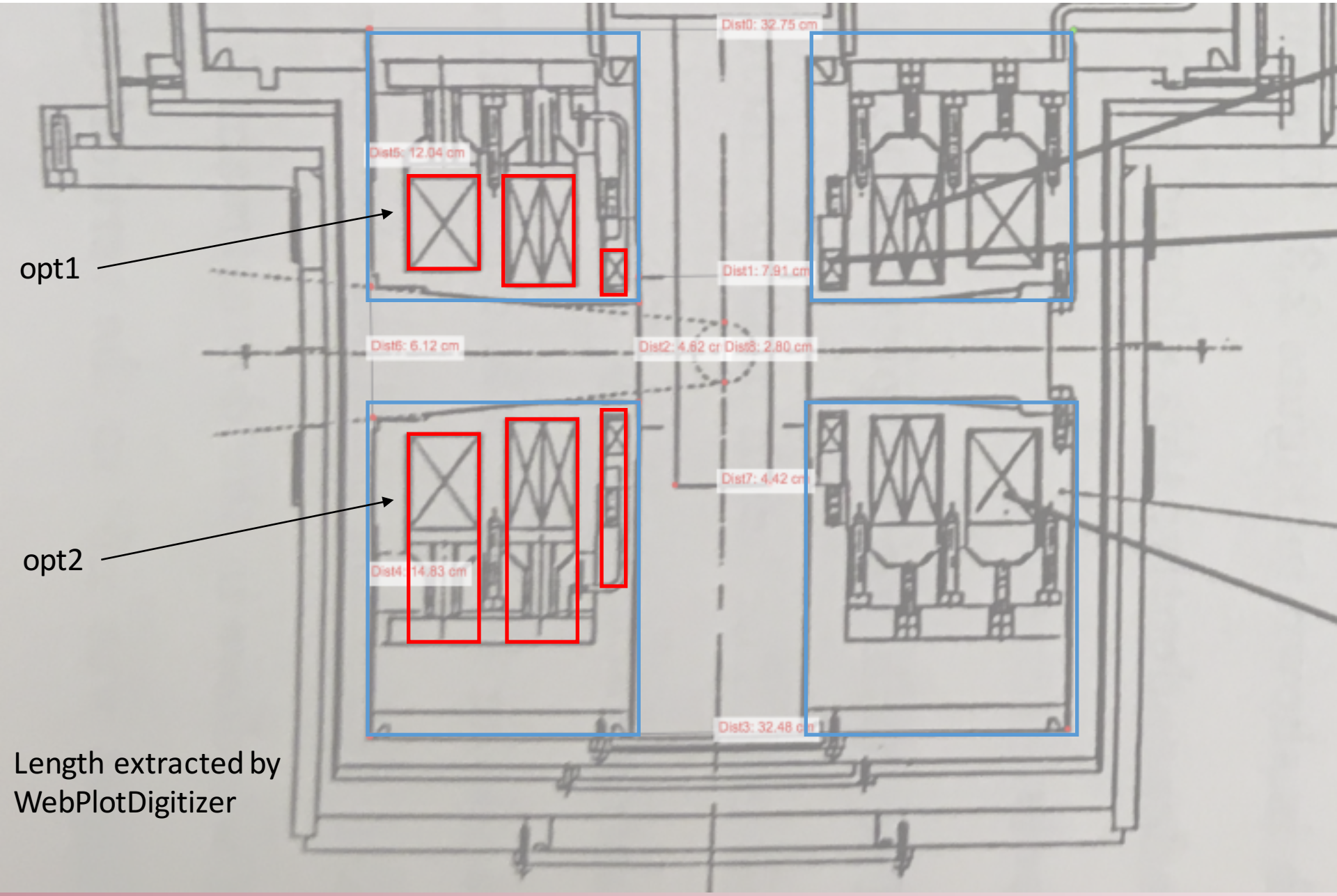


Figure 2.3: 5 T Superconducting Magnet. Side view on left, top view at beam height on right.

BNL - only coil or some of the support



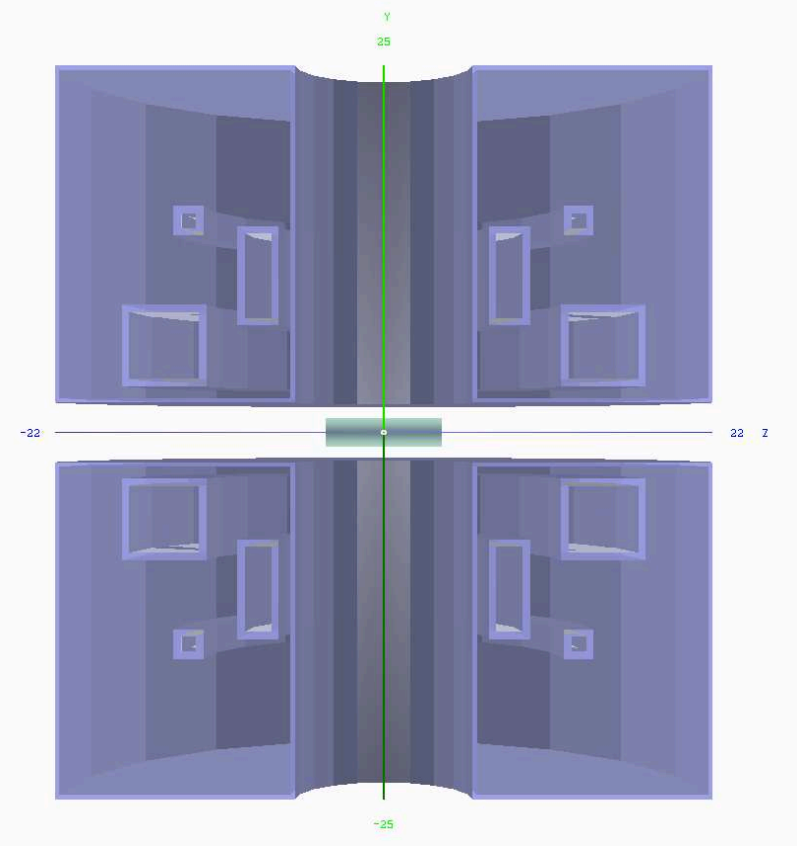
Length extracted by WebPlotDigitizer

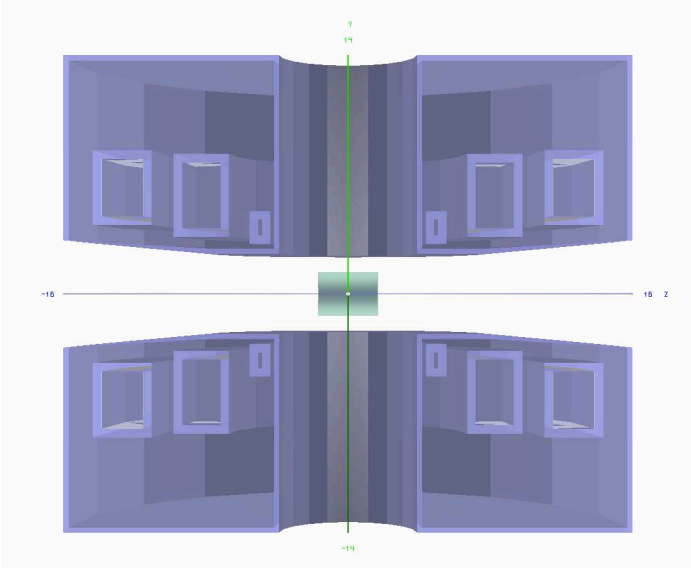
G4 model and simulation setup

Shell: stainless steel 316L, 20% Chromium, 15% Nickel, 5% Molybdenum, and 60% Iron
Outer shell: 0.3 cm, inner shell: 0.5 cm
Coil: 45% Nb, 45% Ti, and 10% Cu
Filled with liquid He

Thanks Dustin for the information

E1039: 120 GeV beam
BNL: 24 GeV beam

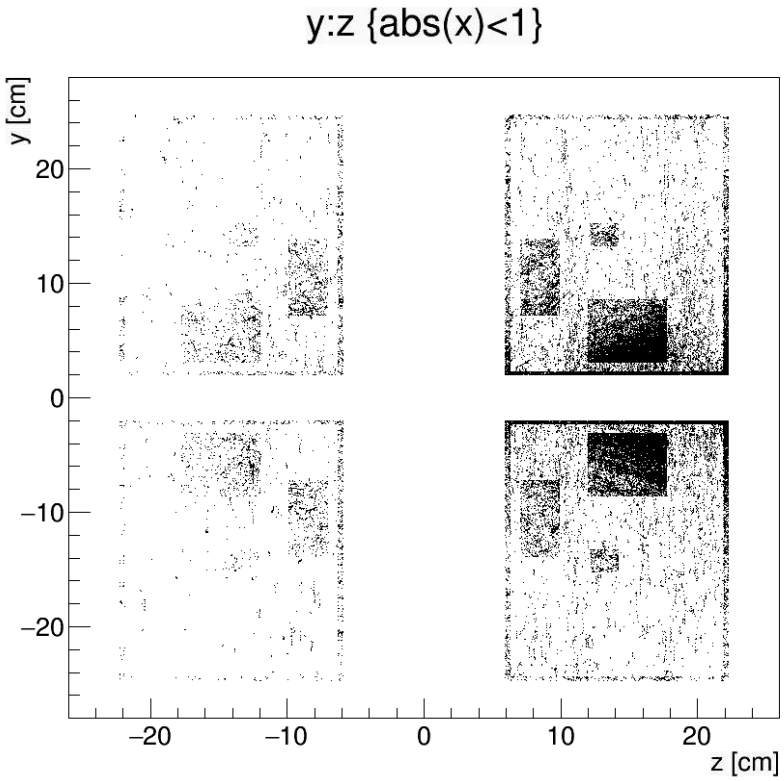


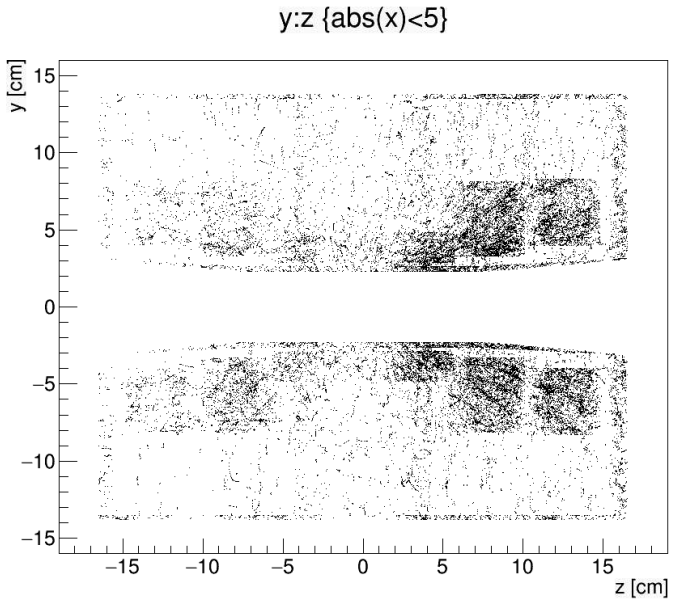


Energy deposition vs position

Energy deposition collected from G4 steps
G4Step::GetTotalEnergyDeposit

As a verification for the constructed geometry





Compared with solid tube geometry

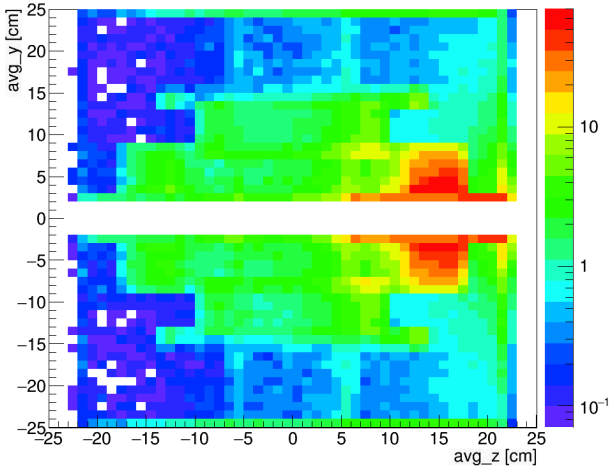
Simulated 1e5 protons each
Numbers in Joule are scaled to 1e12

E1039

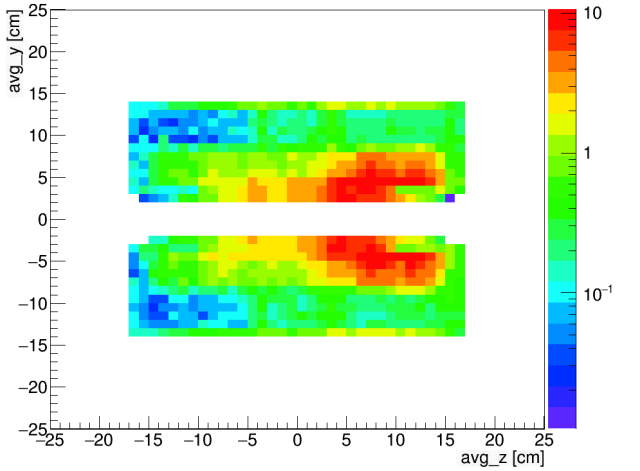
BNL

More Realistic Geometry
This batch

6.3e3GeV ~ 10.1 J

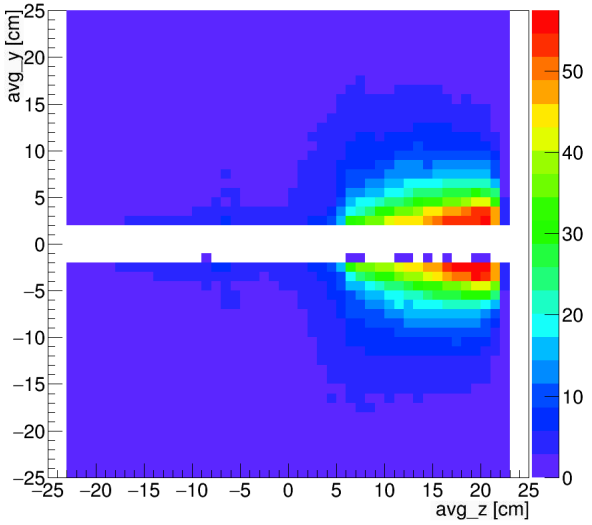


1.3e3GeV1.9 J



Solid tube
50% Fe
50% LHe

9.8e3GeV ~ 15.7J



1.5e3GeV ~ 2.4J