FLUKA Update

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Simulation Meeting

April 2, 2024

Meeting with TRIUMF

Spoke to Rock Neveau

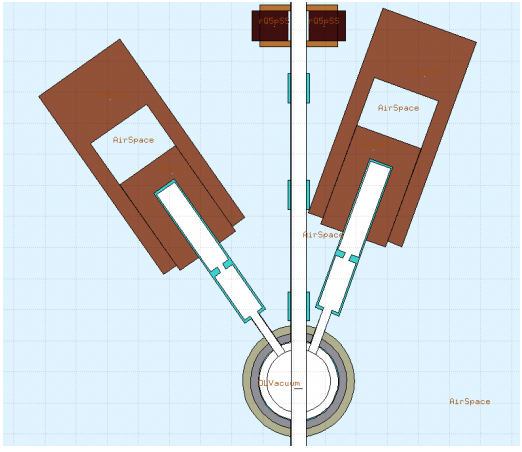
- Generally happy with FLUKA work done so far
- Once shielding is finalized, schedule second meeting with Rock and Roxana
- Rock will give seal of approval, and TRIUMF safety personnel, likely Max, will write safety report with us
- Rock asked me to mention I have worked with Ricardo at BNL on this
- No one at TRIUMF will need to go over code or verify simulation in detail
- Should have safety report in CNSC's hands by July if we want to run in the fall
- No need to mention electronics hut in safety report

Simulated Shielding

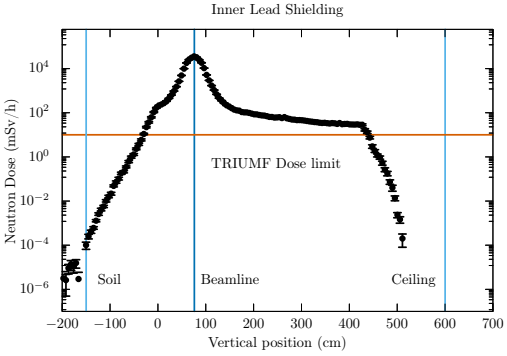
Currently:

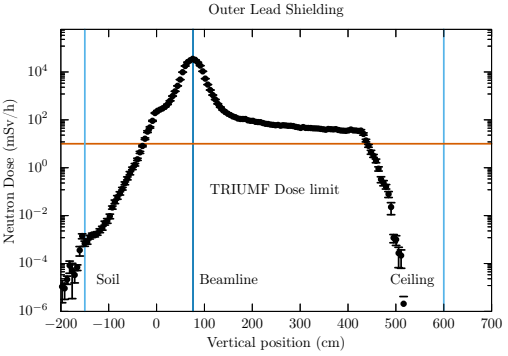
- 1 inch of lead and 1 inch of B-PE around the chamber
- Switch positions of lead and B-PE to see if that has a noticeable impact on dose
- 1 inch wall of lead around GEMs

Unfortunately, exact placement of permanent magnets is still up in the air, can impact shielding



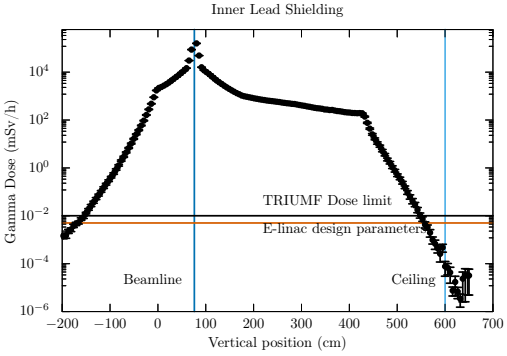
Neutron Dose

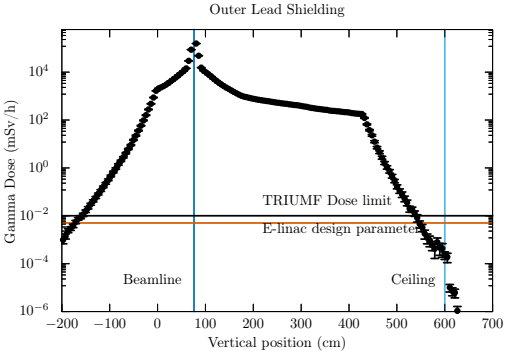




We need to keep the dose at soil level below 10 mSv/h. Easily achieve this requirement. Note that original report also required less than 10 mSv/h on floor at $y = 0$, but original plan did not achieve that, so ok if we don't also.

Gamma Dose





We need to keep the dose at ceiling level below 5 μSv/h. Easily achieve this requirement.

TRIUMF Safety Summary

We achieve TRIUMF safety limits in either configuration.

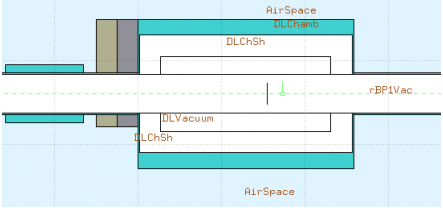
- We should decide that lead closest to the chamber is the recommended shielding configuration
- Minimizes weight of lead
- Rock is uninterested in experiment shielding, but concerned about TRIUMF safety requirements
- Once we have beam optics, I will run the simulation and schedule a meeting with him

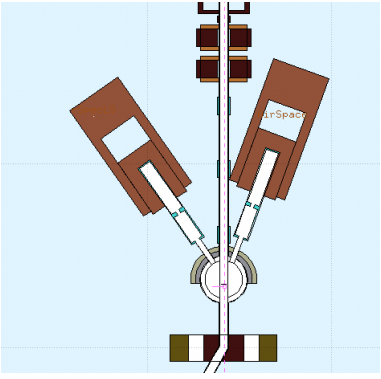
Am I missing anything?

DarkLight Optimizations

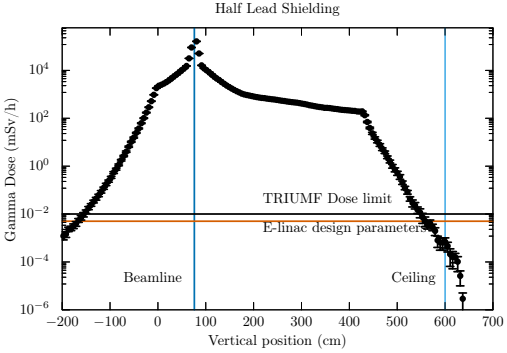
While the shielding presented passes safety concerns for TRIUMF it is a bit overkill.

- Remove back half of Pb and B-PE
- Remove bottom 5 cm of Pb and B-PE
- 17.86 kg of Pb
- Don't want to touch magnets until final optics in place

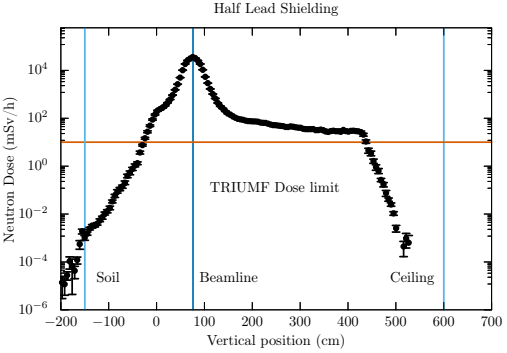




Half Shielding Dose



Dose from γ with half shielding



Dose from n with half shielding

Again, from a safety perspective, we are below the dose requirements.