Front end energy deposition (g4beamline)

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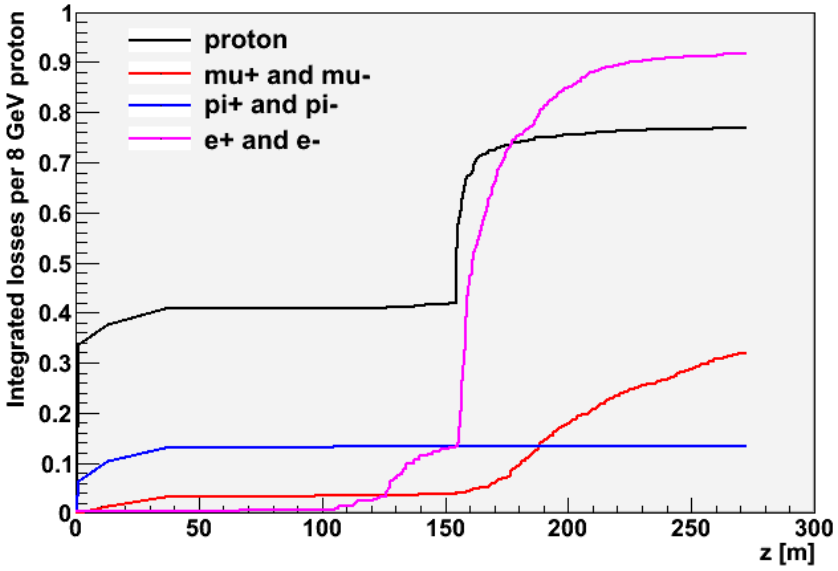
Particle loss tracking in g4beamline

- I modified g4beamline slightly, so that every time a particle hits a volume with kill=1, its longitudinal coordinate, kinetic energy, stat. weight, particle ID and the name of the volume is written on the log file:

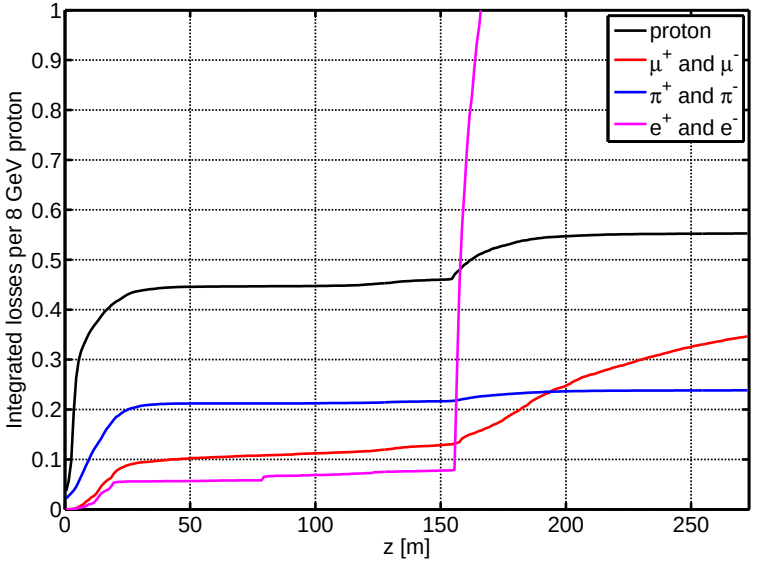
```
DEPO> 165424 91.36 3.216 11 'RF_cooler_7-1'
DEPO> 168725 243.049 3.216 22 'RFwall'
DEPO> 164225 83.8923 3.216 22 'RFwall'
DEPO> 162189 1.97105 3.216 22 'ApertureCooler'
DEPO> 12797.3 1874.82 1.943 211 'ApertureCapture'
```

- This allows me to collect information on particle loss and energy deposition.
- All the secondary particles are accounted for.

Integrated losses



ICOOL (by Chris)



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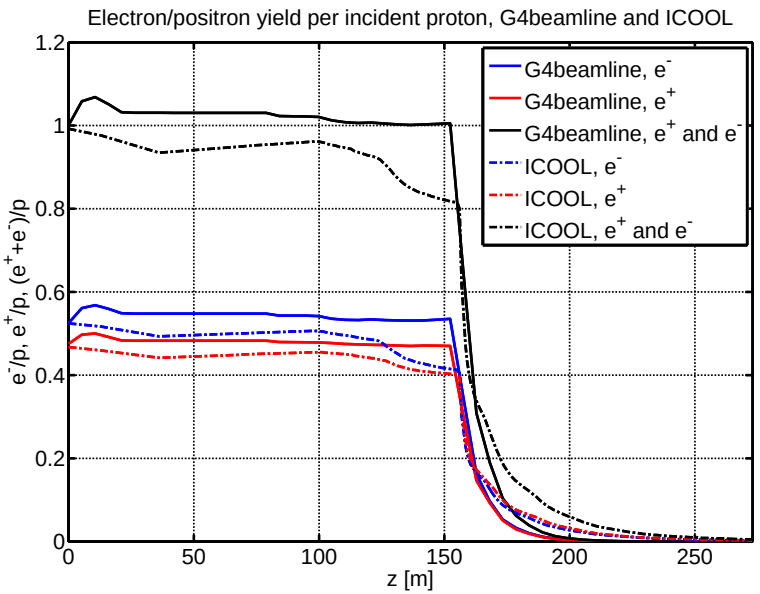
- All losses are higher in the capture/drift/buncher region;
- proton losses do not increase dramatically in the phase rotator;
- electron losses are way higher than in ICOOL,
- some explanations — next slide.

Electron losses



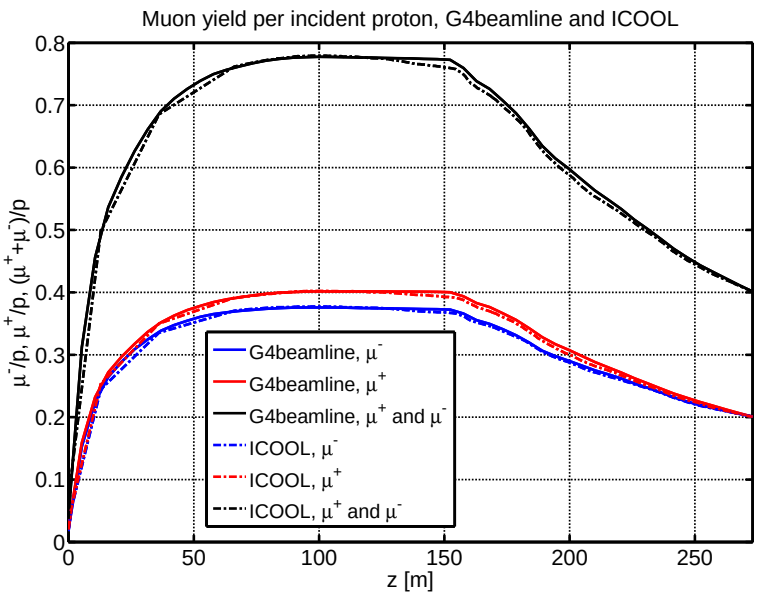
Number of electrons in the beam (g4beamline vs ICOOL, see previous meeting)

- Electron loss is more intense in the rotator/cooler in g4beamline compared to ICOOL, as evidenced by the transmission graph shown at the previous meeting. That explains the curve in the previous slide.
- What seems to be counterintuitive is the fact that both transmission and losses are higher in g4beamline in the capture/drift/buncher.

Proton losses

- Proton losses are higher in rotator/cooler in ICOOL, since protons stopped in the absorber are taken into account.
- Difference in proton losses in capture/drift/buncher (0.45 vs 0.4) is harder to explain, but it might have to do with the total number of particles tracked (I only tracked about 70000 particles).

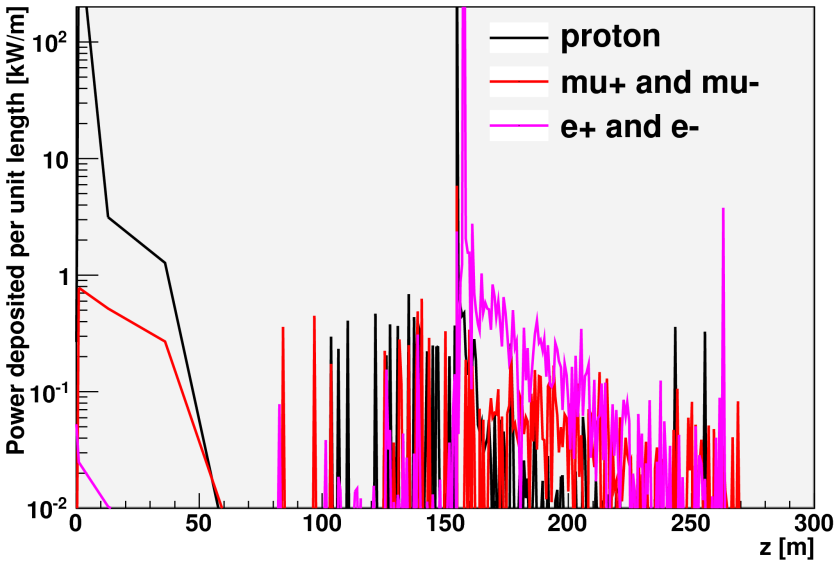
Muon losses



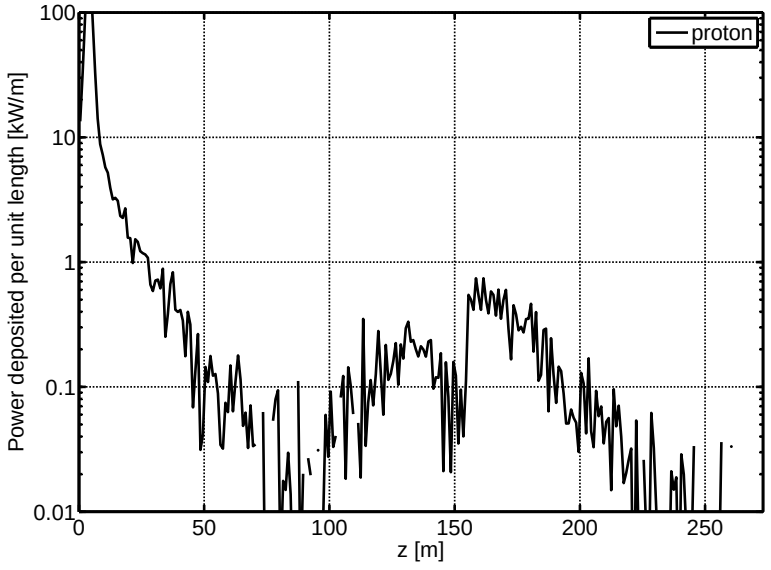
Number of muons in the beam (g4beamline vs ICOOL, see previous meeting)

- Muon transmission is virtually the same in both ICOOL and G4beamline.
- Integrated losses converge toward the end of the cooling channel to about 0.35 (slide 3).
- Why there is so much difference in the capture/drift/buncher region is a question.
- I will try to re-run beam loss simulation in ICOOL with new initial distribution to see if it makes a difference.

Energy deposition I: protons



ICOOL (by Chris)



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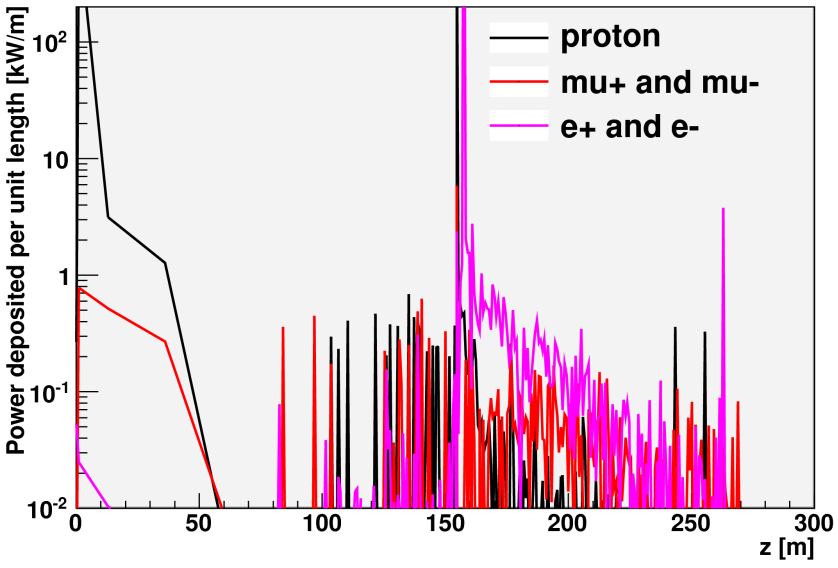
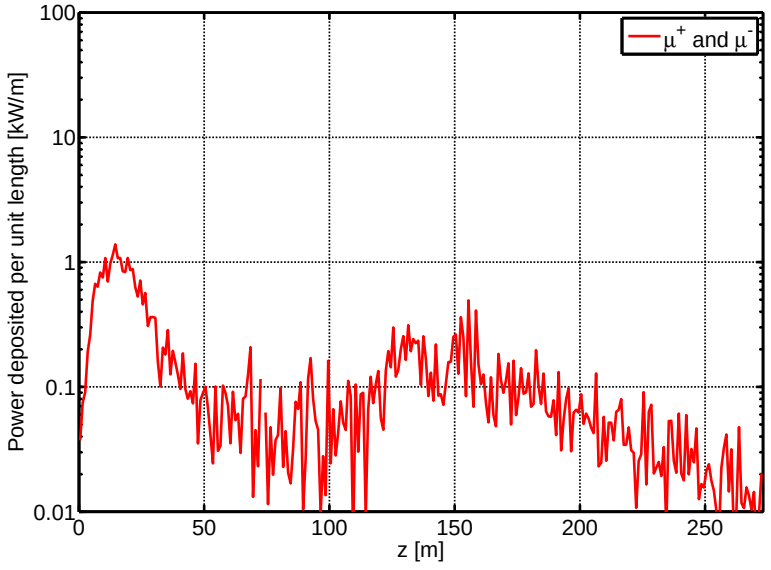
Energy deposition II: muons



ICOOL (by Chris)



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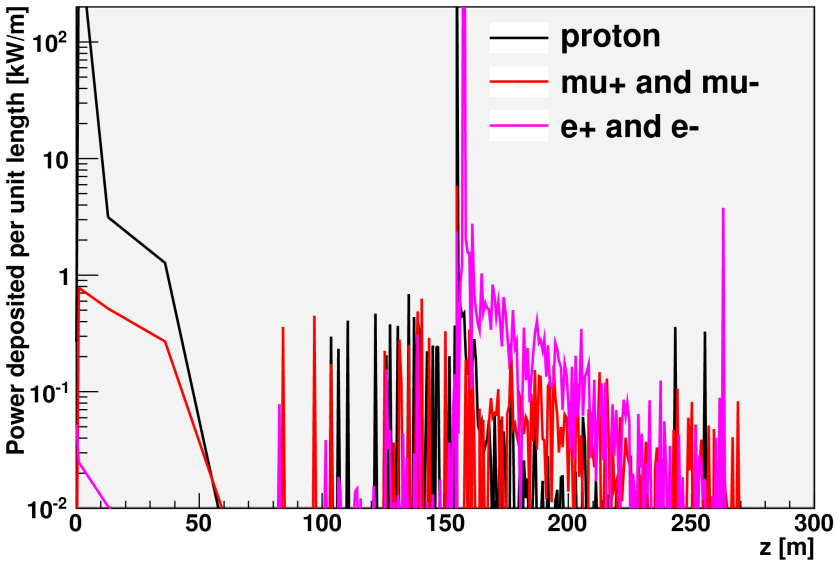
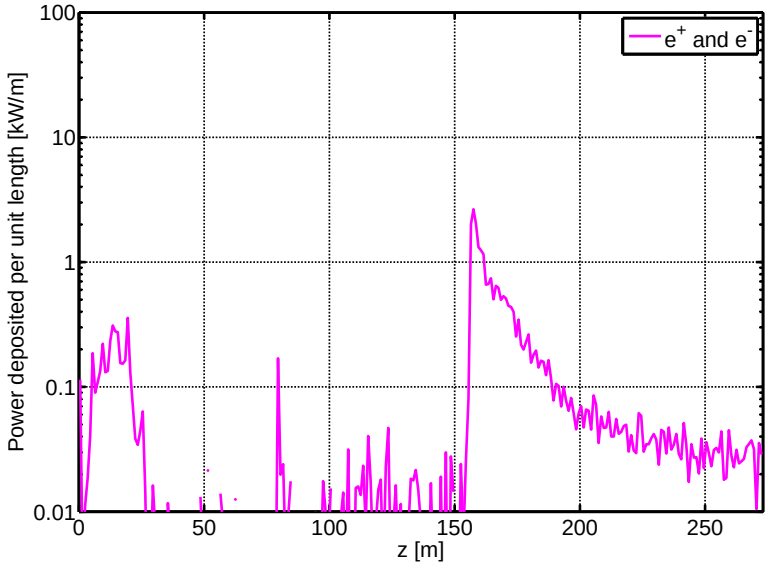
Energy deposition III: electrons



ICOOL (by Chris)



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