Dose Rates

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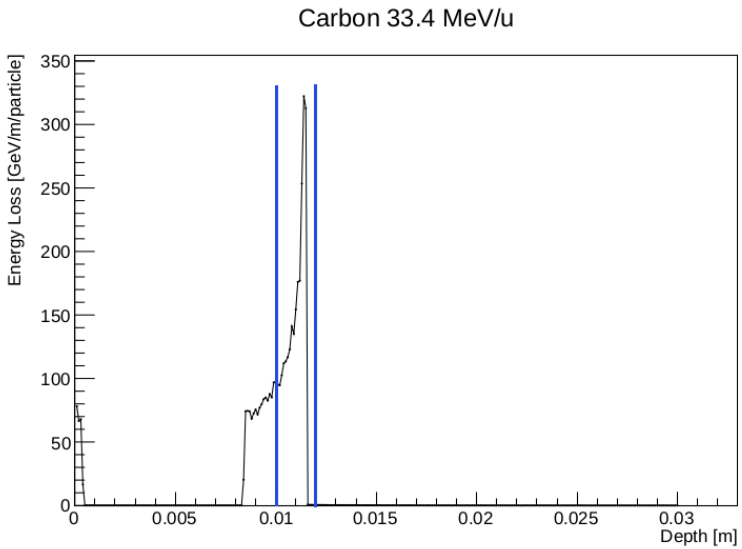
Table Summary

	12 MeV	15 MeV	127.4 MeV	c33.4 MeV/u
Scaled Energy [J]	2.98×10^{-4}	5.4×10^{-4}	6.93×10^{-4}	1.30×10^{-2}
Dose per pulse [Gy]	6.75	12.23	15.7	294.6
Instantaneous dose rate [Gy/s]	?	?	?	?
Average dose rate [Gy/s]	67.5	122.3	157	2946

Table: Summary table.

In table, proton energies are scaled to 10^9 particles and carbon scaled to $\frac{10^9}{3}$

Carbon 33.4 MeV/u – including phantom+endstation materials



Energy in chamber (blue) = 2435.52 GeV

Consistency Check:

$$\begin{aligned} \text{Integral outside blue} &= 1552.21\ \text{GeV} \\ \text{Integral within blue} &= 2436.85\ \text{GeV} \\ \text{Sum} &= 3989.06\ \text{GeV} \end{aligned}$$

$$\begin{aligned} \text{Initial Beam} &= (0.0334 \times 12) \times 10^4\ \text{GeV} \\ &= 4008\ \text{GeV} \end{aligned}$$

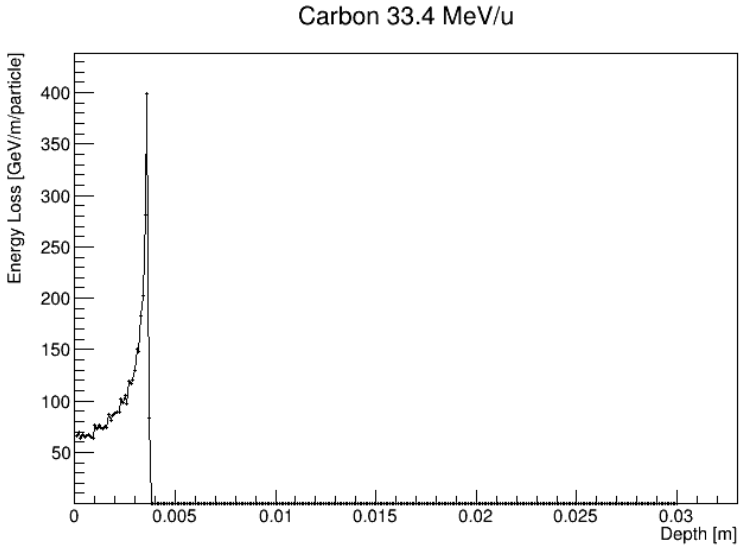
Location of Eloss

- Eloss in material = 3989.06 GeV
- Eloss in world (air) = 0.864 GeV
- Eloss exiting sim = 6.504 GeV
- Sum Eloss = 3996.43 GeV

- Unaccounted eloss = **11.57 GeV**

Carbon 33.4 MeV/u – into 30 mm of water for comparison

Simulated 33.4 MeV/u carbon (Total Energy = 11.5757 GeV) into "G4_WATER".



Consistency Check:

$$\text{Integral curve} = 3991.46\,\text{GeV}$$

$$\text{Initial Beam} = (0.0334 \times 12) \times 10^4\,\text{GeV}$$
$$= 4008\,\text{GeV}$$

Location of Eloss

- Eloss in material = 3991.46 GeV
- Eloss in world (air) = 0.496 GeV
- Eloss exiting sim = 5.328 GeV
- Sum Eloss = 3997.28 GeV

- Unaccounted eloss = **10.72 GeV**