

Klong beam line simulation toy MC

using greant4 building a toy MC with a Be production target (dark red), a W-plug (yellow box) a beam line (cyan) and liquid hydrogen target (dark blue):

Be production target: 6cm diameter, 40cm long

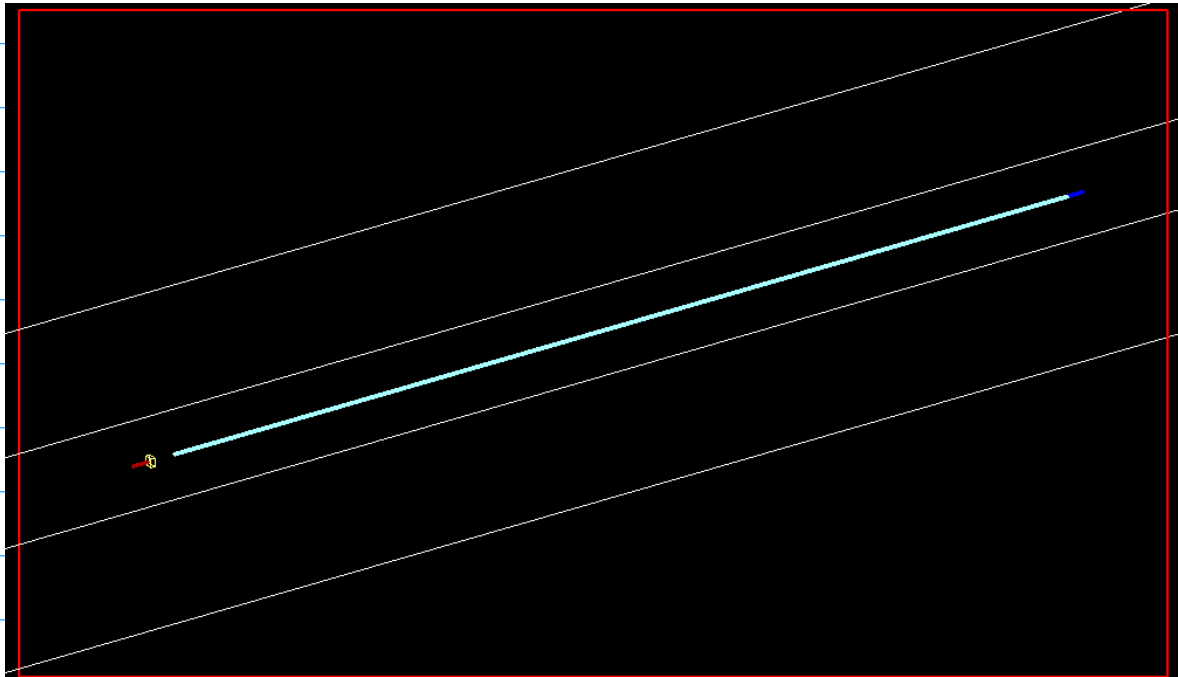
W-plug: 10cm by 10cm by 10cm

Air gap: 55cm

Beam line: 2250cm

LH target: 6cm diameter 40cm long

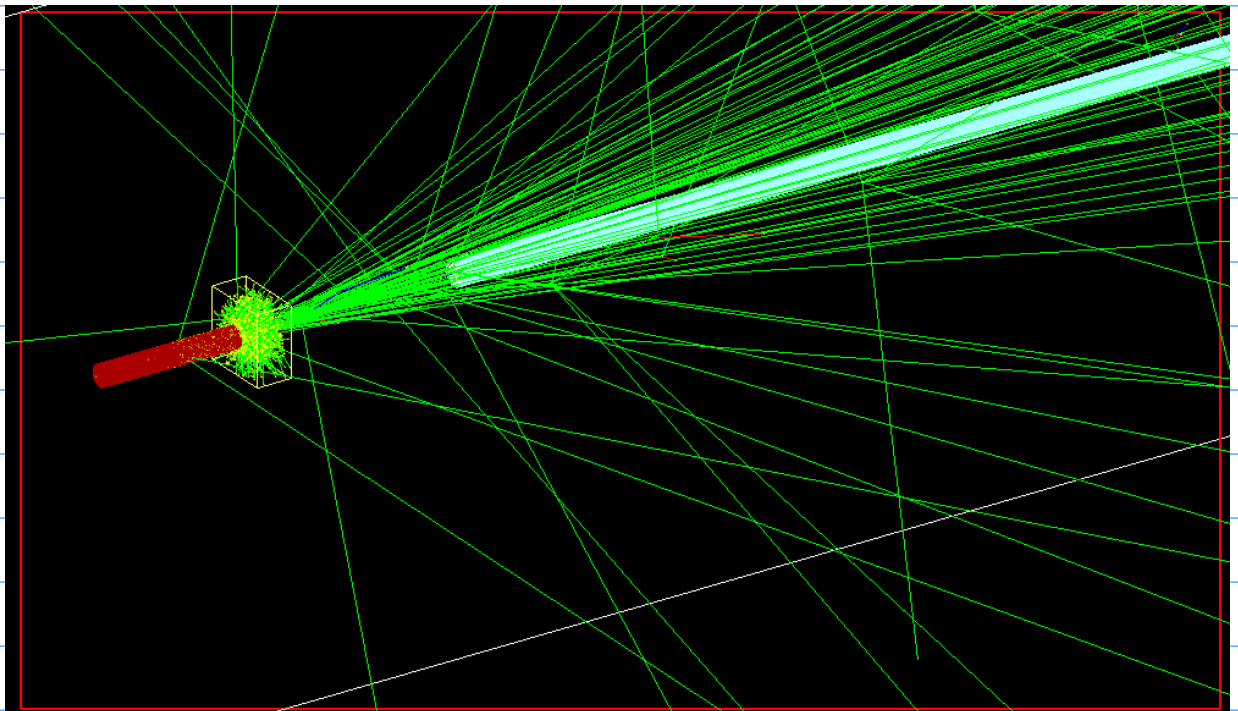
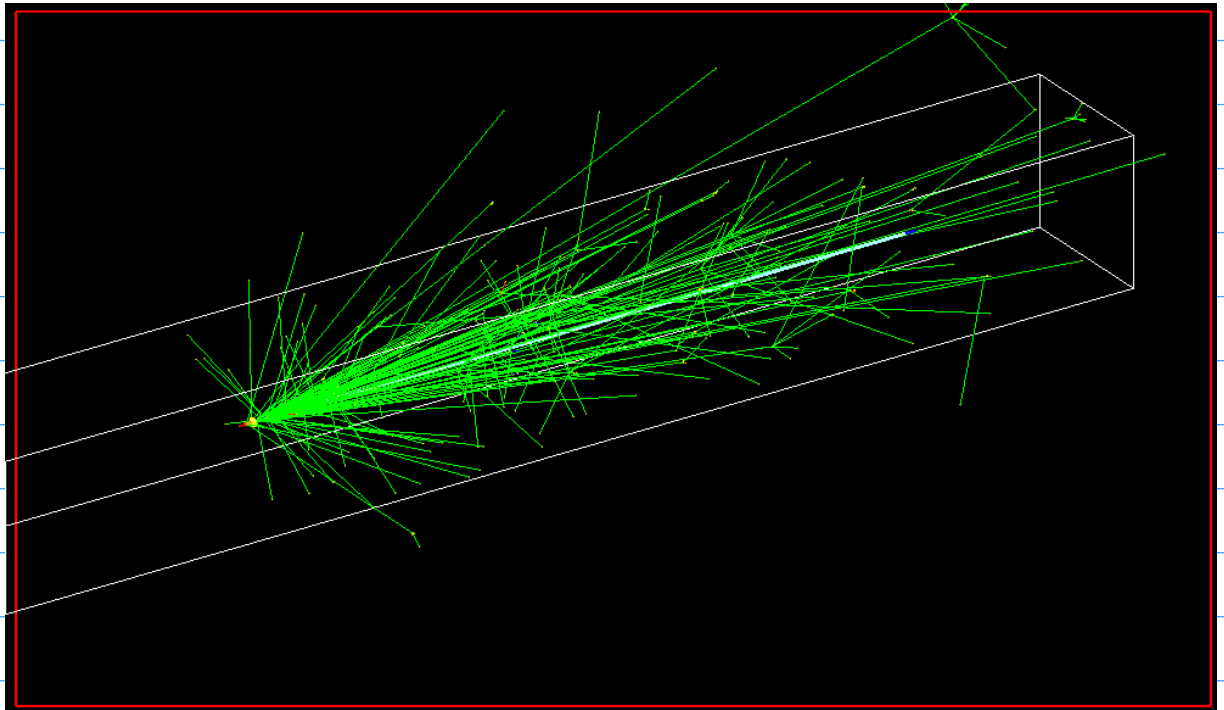
distance center Be target to center LH target 2400cm



as a first test 10000 Klong are thrown from the center of the Be production target along the z-axis with various momenta and it was registered how often the Klong reaches the liquid hydrogen target. As seen in the list below, at 2 GeV/c momentum the transmission probability is about 10% while at 500MeV/c the transmission rate is 7% and at 300MeV/c it is less than 3%.

Klong Momentum	Throw-in-Be	Arrive-in-LH
4000 MeV	10000	1400
3000 MeV	10000	1244
2000 MeV	10000	1091
1500 MeV	10000	820
1100 MeV	10000	742
1000 MeV	10000	765
900 MeV	10000	754
800 MeV	10000	801
700 MeV	10000	748
600 MeV	10000	728
500 MeV	10000	694
400 MeV	10000	523
300 MeV	10000	289
200 MeV	10000	87

Example of Klong simulation showing only the Klong trajectories. All the secondaries are not shown. Many Klong particles scatter in the Be target or the W-plug as can be seen in the second plot. The surrounding environment of the Be Target, W-plug and beam line is air.



The two plots above represent 1000 thrown Klong with 500MeV/c mometa starting from the center of the Be-procution target.

Many of the Klong particles scatter in the Be production target but much more likely in the W-plug where most of the Klong particles actually will stop. Those Klong's that are scattering only at small angle will cause a Klong "beam" spread significantly such that most of the Klong particles will not even enter the beam pipe.

This means heavy shielding is required not only around the Be procution target and the W-plug but also along the beam line for as long as possible in beam direction as many Klong particles and many other type of neutral particles will exit the beam pipe or scatter along the beam pipe and cause other reaction and radiation background.