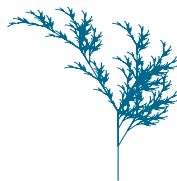


SBS Meeting

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University of Connecticut



April 19, 2017

GMN SIMULATION INTRO.

ELECTRONICS HUT ANALYSIS

APPENDIX

G_M^n SIMULATION INTRO.

$Q^2(\text{GeV}^2)$	$\theta_{BB}(\text{deg})$	$d_{BB}(\text{m})$	$E_{beam}(\text{GeV})$	$I_{beam}(\mu\text{A})$
13.5	33.0	1.55	11.0	44.0

- ▶ 10 cm LD₂ target
- ▶ Looked at dose rates within Preshower as a cross-check with Eric's results (details are in the Appendix)
- ▶ Looked at the dose rate and particle fluxes within the electronics shielding hut

GEOMETRY

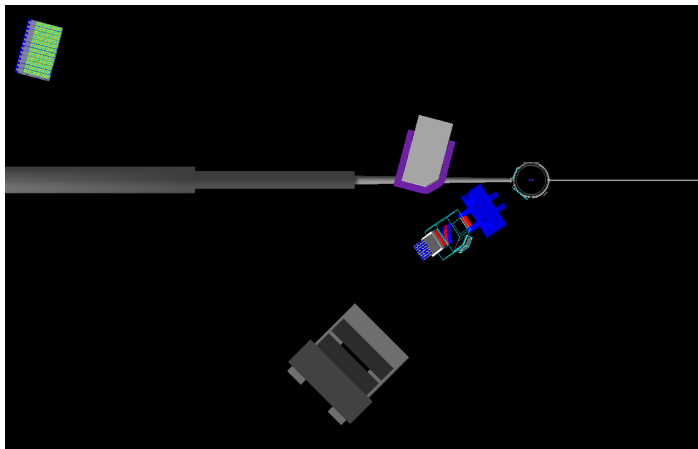


Figure: The hut face is located roughly 7.2 m from the target in the xz plane at a central angle of 45 degrees. All hut materials are steel.

GEOMETRY II

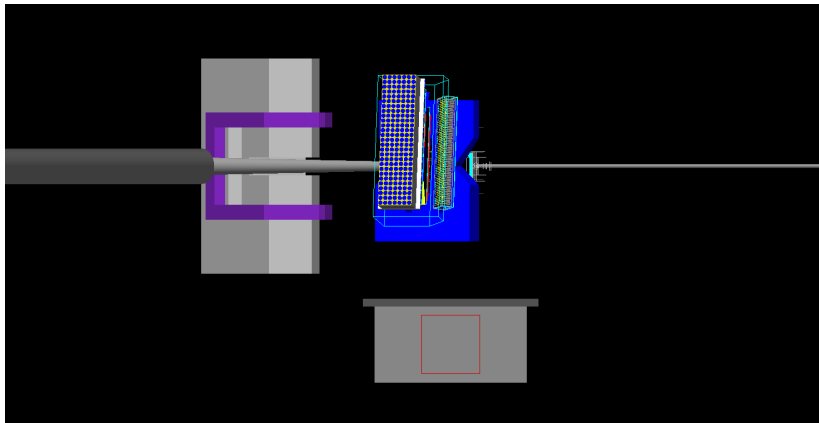


Figure: Hut sits on the floor, or roughly -3 m in the y direction. The red box represents the sensitive region for the purposes of this simulation.

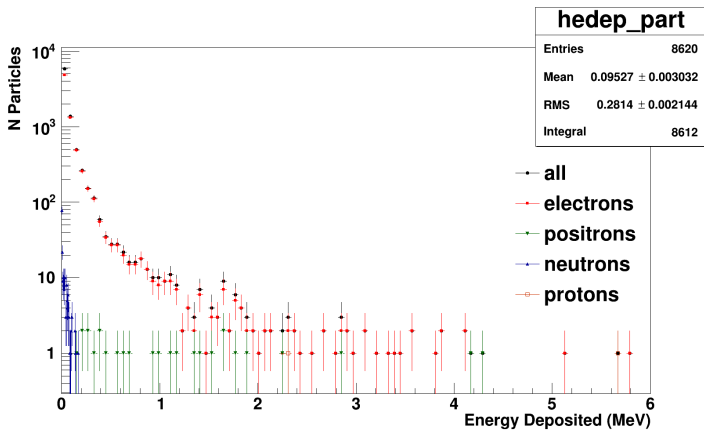
G_M^n ELECTRONICS HUT

$Q^2(\text{GeV}^2)$	$\theta_{BB}(\text{deg})$	$d_{BB}(\text{m})$	$E_{beam}(\text{GeV})$	$I_{beam}(\mu\text{A})$
13.5	33.0	1.55	11.0	44.0

- ▶ Ran 15×10^9 events with the beam generator
- ▶ Silicon sensitive region is $101.6 \times 101.6 \times 2.54 \text{ cm}^3$
- ▶ Density of Silicon used = 2.33 g/cm^3
- ▶ Total energy deposited = 910 MeV
- ▶ Results:

Dose rate = 0.016 rad/hr

ENERGY DEPOSITION BY PARTICLE



1. e^{\pm} account for $\sim 96\%$ of the total energy deposited
2. Nucleons account for around 3%
3. The average energy deposited by photons is ~ 1.8 keV

ELECTRONS

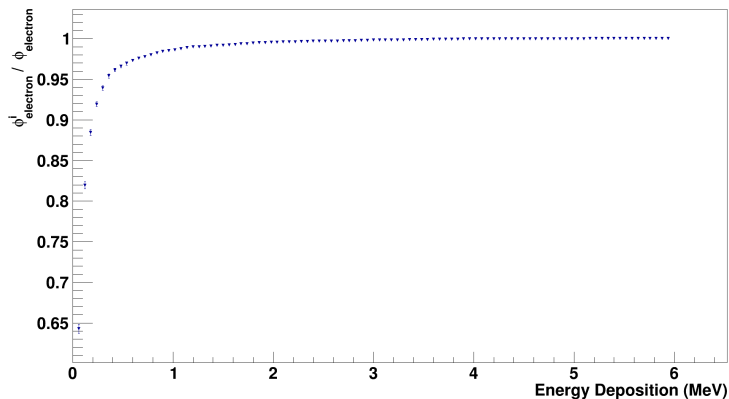


Figure: Integral of particle flux to bin i (E^i) normalized by the total particle flux as a function of particle energy deposition.

Appendix

BIGBITE PACKAGE

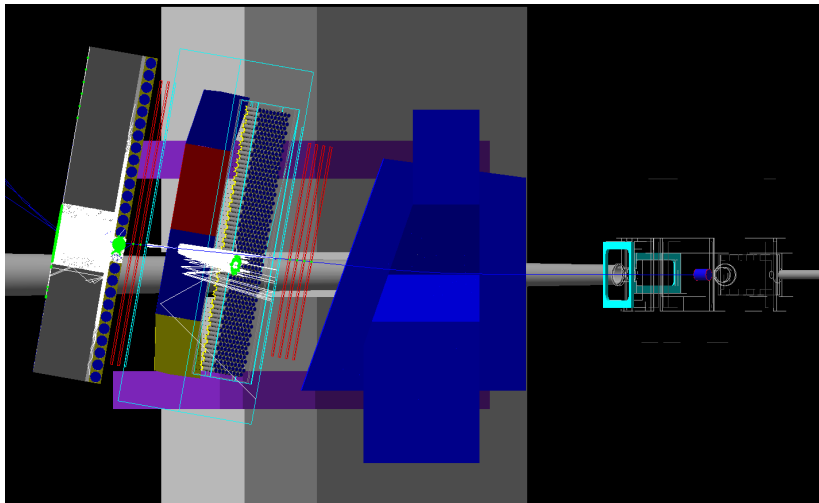


Figure: Side angle of 5 GeV electron traveling through BigBite.

PS DOSE RATE

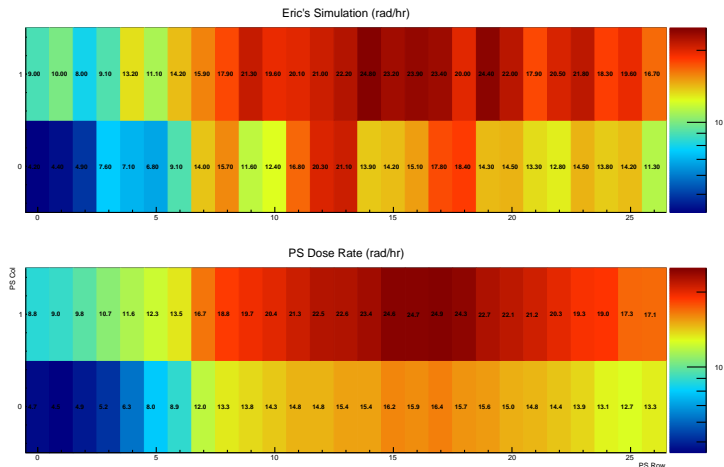


Figure: Comparison between Eric's simulation (top) and this work (bottom). Note that row 0, col 0 corresponds to the top-left module of the PS if one looks downstream.

PRESHOWER DOSE RATE

$Q^2(\text{GeV}^2)$	$\theta_{BB}(\text{deg})$	$d_{BB}(\text{m})$	$E_{beam}(\text{GeV})$	$I_{beam}(\mu\text{A})$
13.5	33.0	1.55	11.0	44.0

- ▶ Ran 15×10^9 events using the beam generator
- ▶ Density of TF1 used = 3.86 g/cm^3
- ▶ PS blocks are 37.0×8.5 by 8.5 cm^3

	This work	Eric
Preshower Sum (rad/hr)	832	833
Block Avg (rad/hr)	15.4	15.4
Column 1 Avg (rad/hr)	12.3	12.7
Column 2 Avg (rad/hr)	18.4	18.1

GAMMAS

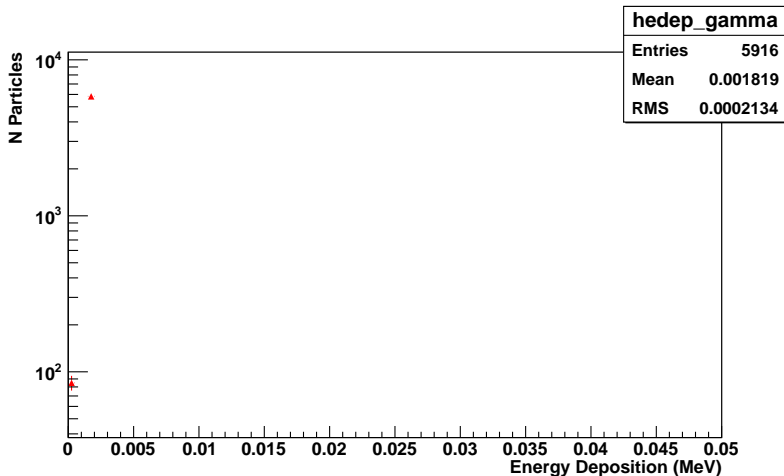


Figure: Energy deposition of gammas within the G_M^n electronics hut.

PARTICLE ORIGINS

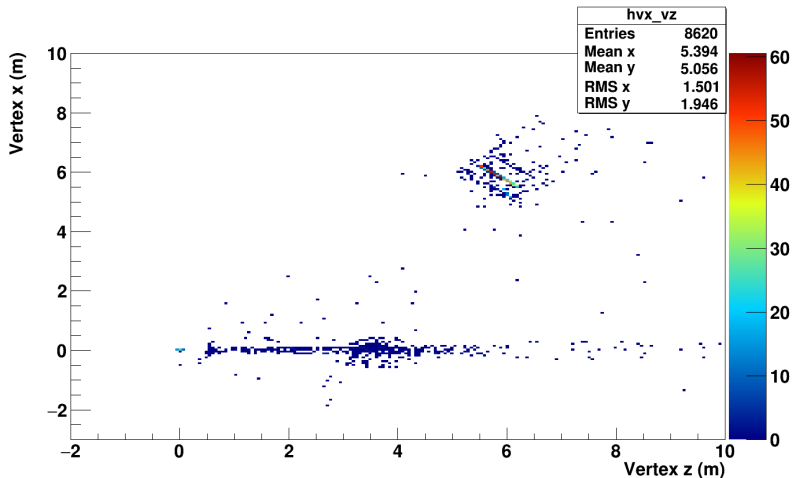
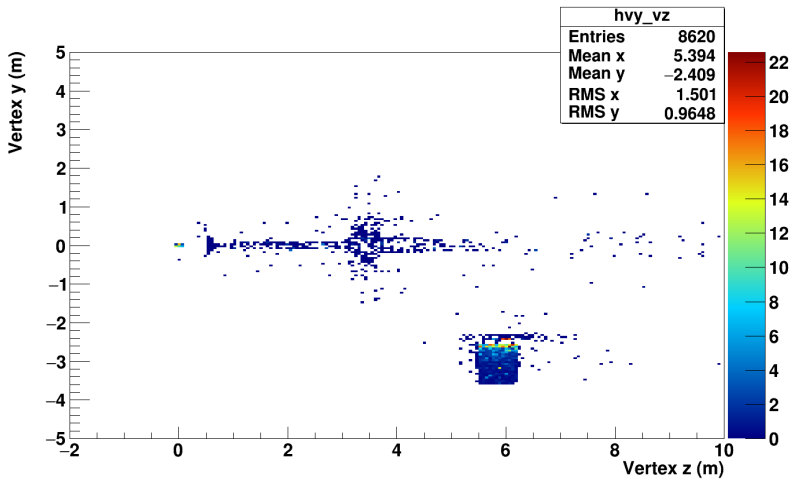


Figure: Vertex v is to be interpreted as the vertex position of the particle that deposited energy within the sensitive region of the hut.

PARTICLE ORIGINS



PARTICLE ORIGINS

