Ferrous Materials:

Detector wall floor rail

9096 – Barite Wall Rail

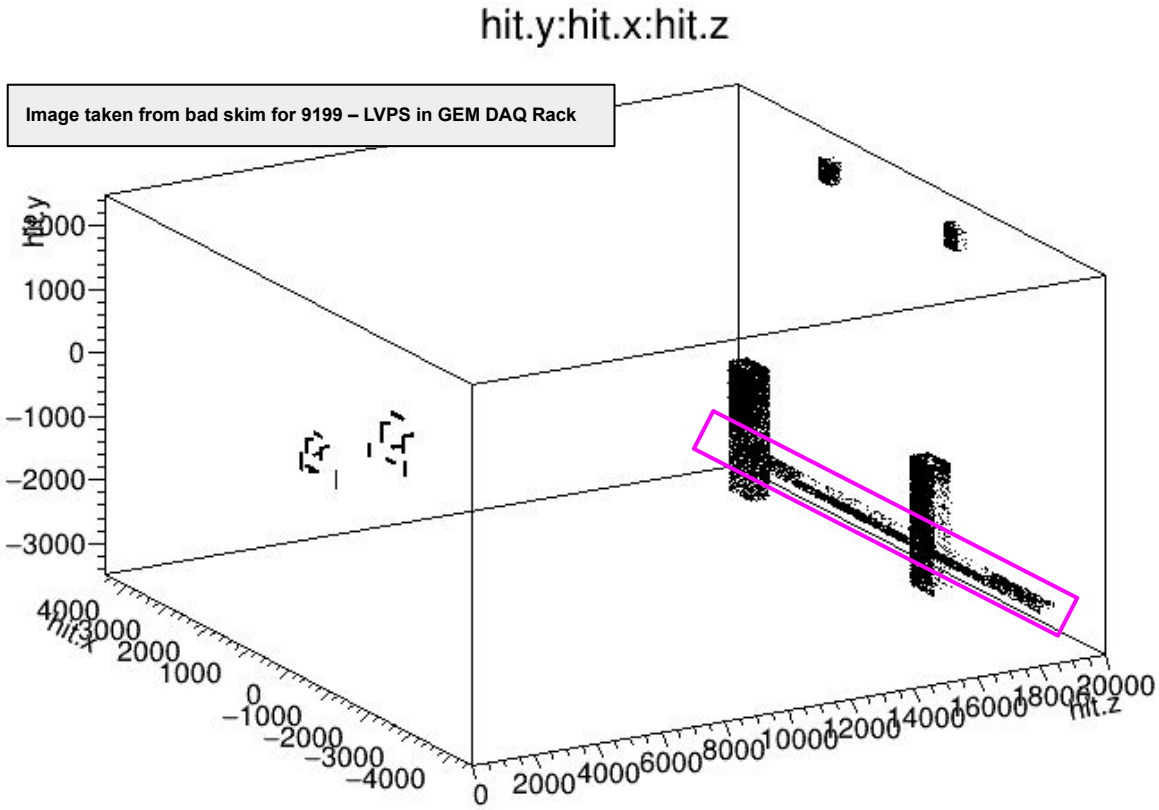
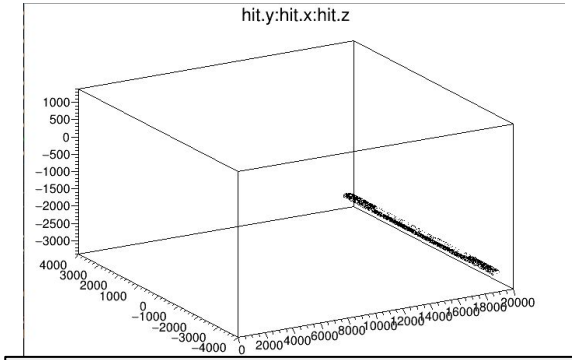


Image taken from bad skim for 9199 – LVPS in GEM DAQ Rack

Modifications from previous…

(1) Size from Cip last meeting a bit wider than before.

(2) Shielding on downstream side of rails.



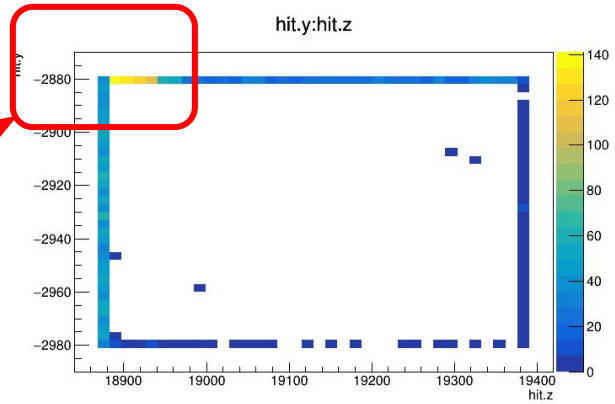
Rail only – skim 9096

9097 – Barite Wall Rails

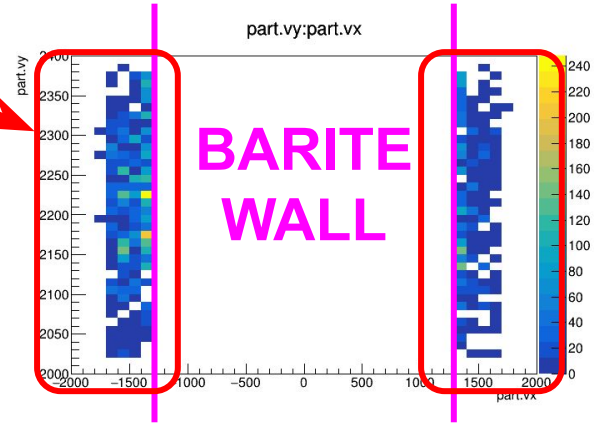
From previous simulation it was evident that

(1) top lip of rail gets the majority of the hits

(2) detector and PMT backgrounds originate from sides where wall is not above.



Hits on rail in primary simulation.



Event particle vertices for hits on 9928 and 9911 in secondary simulation

(New measurements from Cip) Rail is 25” in Z, 302” in X, 5” thick

This increases size from previous simulation

GEM Rotator base is 86” across

Shielding on DS side maybe? Check part.vx and later.

GEM Rotator base is 86” across

Shielding on DS side maybe? Check part.vx and later.

Gem base stops at x=+/- 1092mm

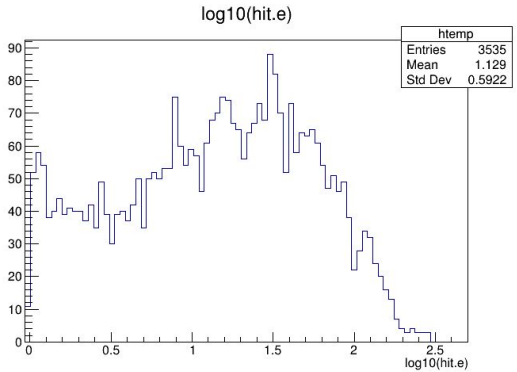
Put lead bricks downstream at +/- 1250mm to +/- 3860mm which is 19 bricks long.

Basic shield intention

Rail Shields

Radlen of Pb is 5.6mm…

⇒ Can we get 1cm plate?
Should be enough to dent
50MeV incident electrons.

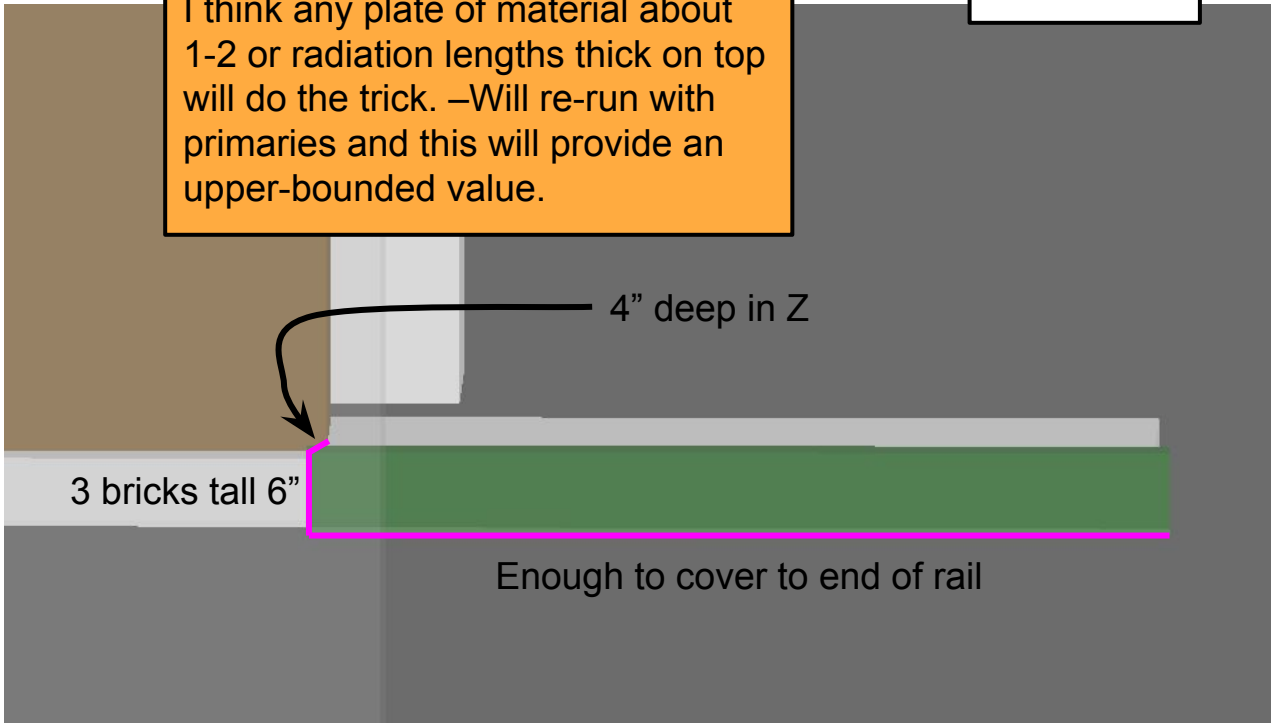


This was a very stupid idea! Backgrounds are coming from particles from top not punch-thru

I think any plate of material about 1-2 or radiation lengths thick on top will do the trick. –Will re-run with primaries and this will provide an upper-bounded value.

$N_{radlen} \rightarrow E_{remain}$

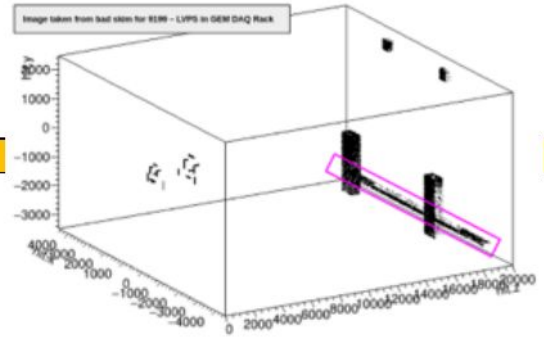
1 → 36%
2 → 13%
3 → 5%
5 → 0.7%



9097 – Barite Wall Rail

Material	X_r	Spin Polarization (P_f)	Frac e- on Target	Frac of events Per Moller
Mild Steel	2000	1E-02	1E-11	1E-07
Stainless Steel (Worst)	1	1E-05	1E-08	1E-04
Stainless Steel (Ideal)	0.01	1E-07	1E-06	1E-02
Aluminum	0.0001	1E-09	1E-04	1E+00
Inconel 625	0.001	1E-08	1E-05	1E-01
Brass/Bronze (Worst)	0.001	1E-08	1E-05	1E-01

STILL BAD – SHIELDING ON TOP NEEDED – 1” Pb???



Collar 2 Barite Wall Rail	
Simulation Date:	5/30/2023
Detector #	9096

Barite Wall Rail -- Unweighted By BField

Total Prims	10,000,000,000	Total Secondaries	500,000	(per sens det)

Primary Counts		
Primaries	0	0&1
9096		3066

Primary Fractional		
Primaries	0	0&1
9096		3.07E-07

(9928 MainDet) Secondary Counts - 0&1		
Secondaries	Electrons	Gammas
9096	183	140

(9928 MainDet) Secondary Fractional - 0&1		
Secondaries	Electrons	Gammas
9096	3.66E-04	2.80E-04

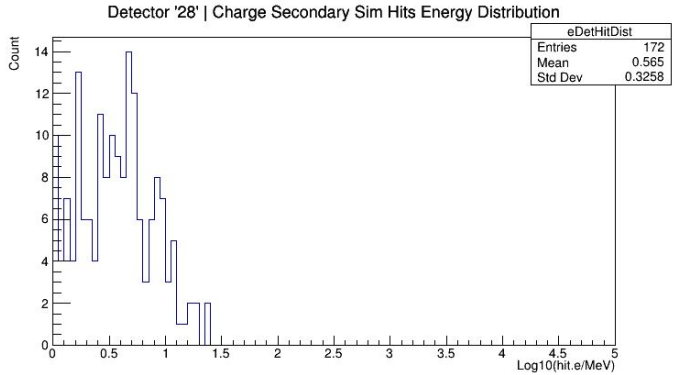
(9928 MainDet) Total Fractional - 0&1		
Secondaries	Electrons	Gammas
9096	1.12E-10	8.58E-11

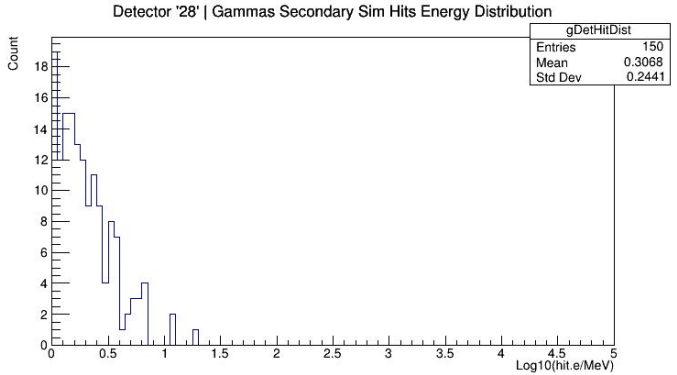
(9911 PMT Region) Secondary Counts - 0&1		
Secondaries	Electrons	Gammas
9096	1031	990

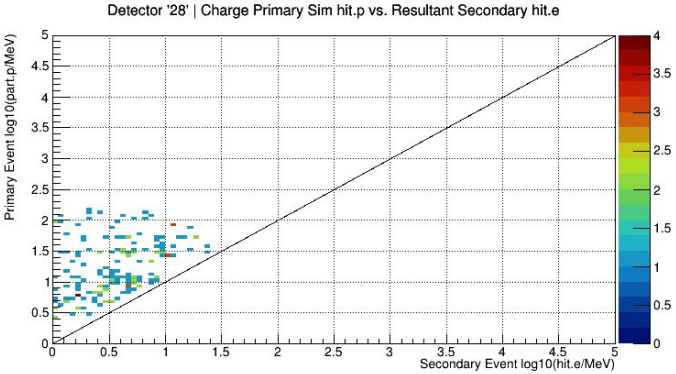
(9911 PMT Region) Secondary Fractional - 0&1		
Secondaries	Electrons	Gammas
9096	2.06E-03	1.98E-03

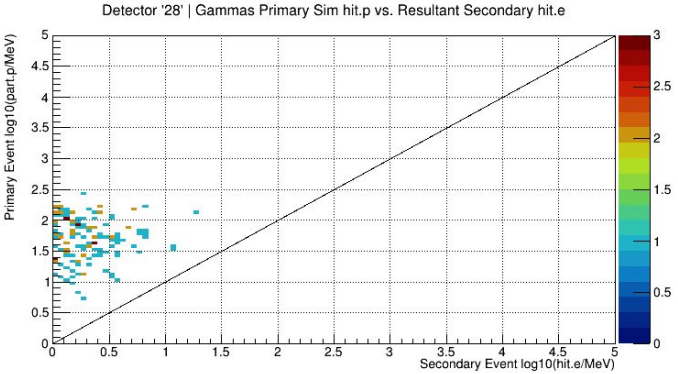
(9911 PMT Region) Total Fractional - 0&1		
Secondaries	Electrons	Gammas
9096	6.32E-10	6.07E-10

9096 – Barite Wall Rail









9096 – Barite Wall Rail