Initial electron beam condition before and after the target

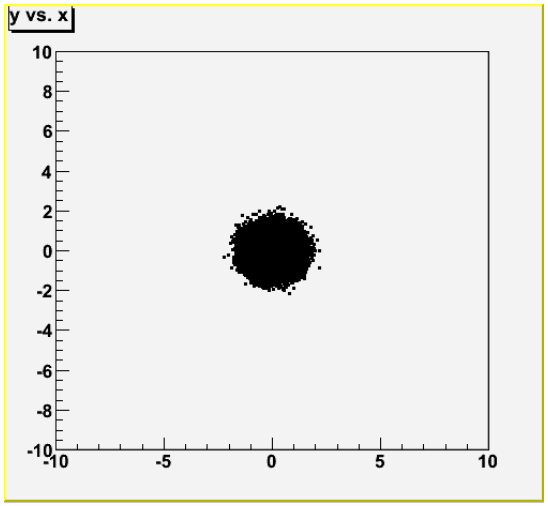
10^5 e- pass 1um Au target & illuminate 1” thick dump : Cu, Al, C, Be

Units are millimeters and MeV/c unless stated

Electrons are RED and Photons are GREEN unless stated

Particles entering target (z = -1)

	Cu 29	Al 13	C 6	Be 4
e-	10^5	10^5	10^5	10^5
γ	0	0	0	0

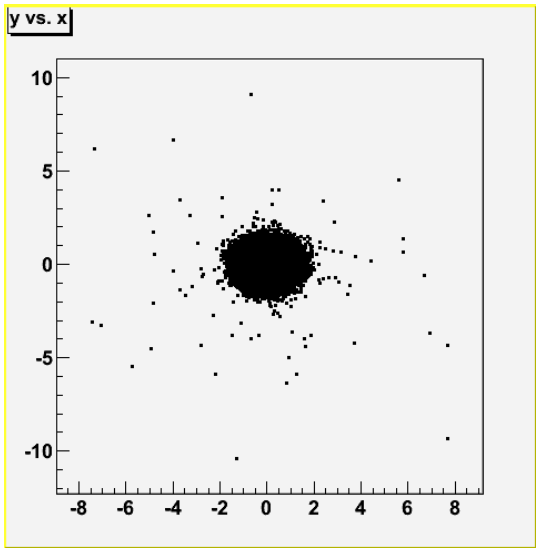


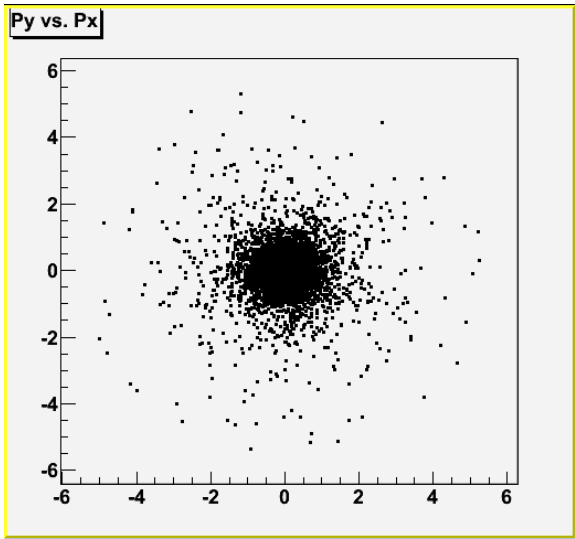
Pencil Beam

- $P_z = 5.5$
- $P_x = P_y = 0$
- $\sigma_x = \sigma_y = 0.5$
- $\sigma_{px} = \sigma_{py} = 0$

Particles exiting target (z = 1, R=12.7)

	Cu 29	Al 13	C 6	Be 4
e-	10^5+65	10^5 +66	10^5+63	10^5+62
γ	226	228	227	231



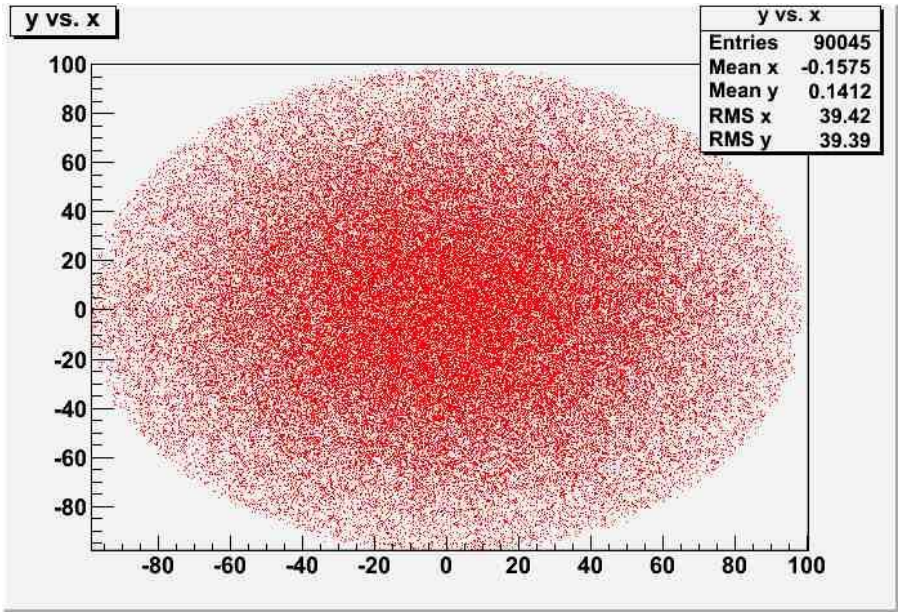


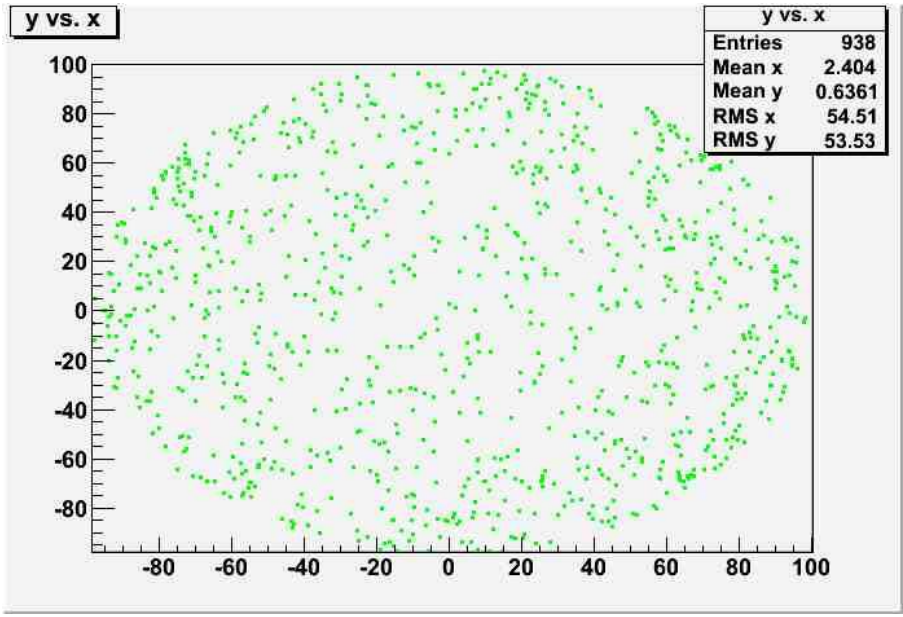
Electron and photon spatial distributions in front of dump (going to or coming from)

1 mm upstream of Dump

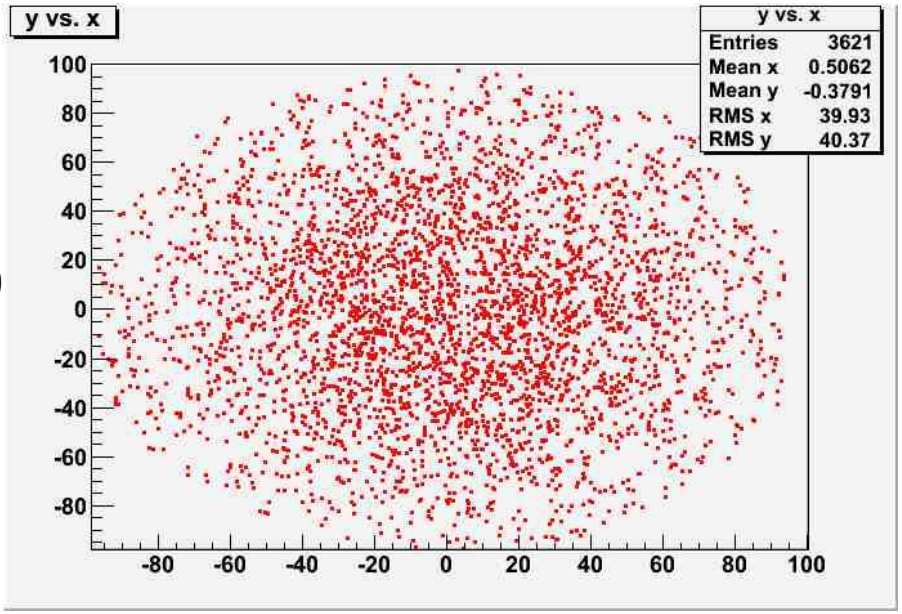
Copper (Z=29)

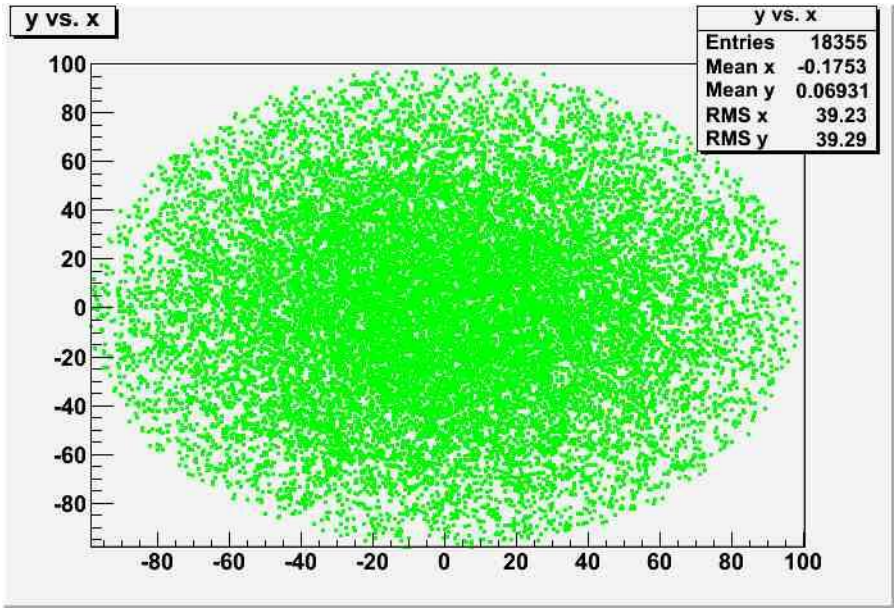
Pz>0





Pz<0

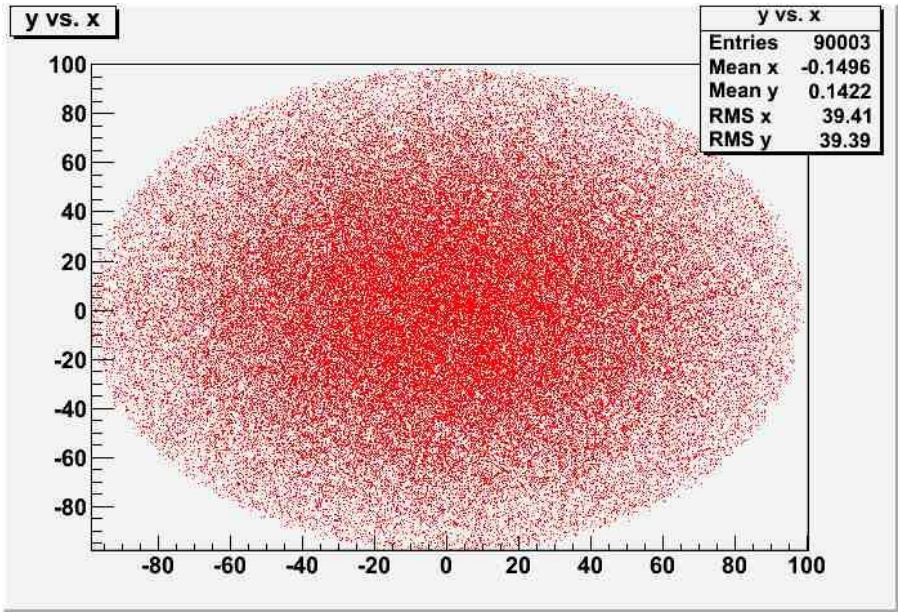


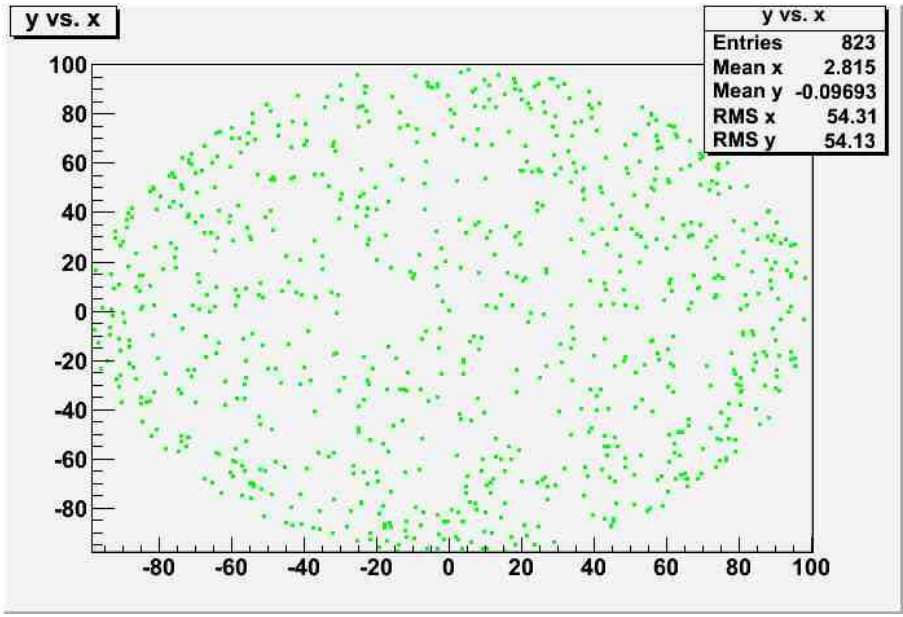


1 mm upstream of Dump

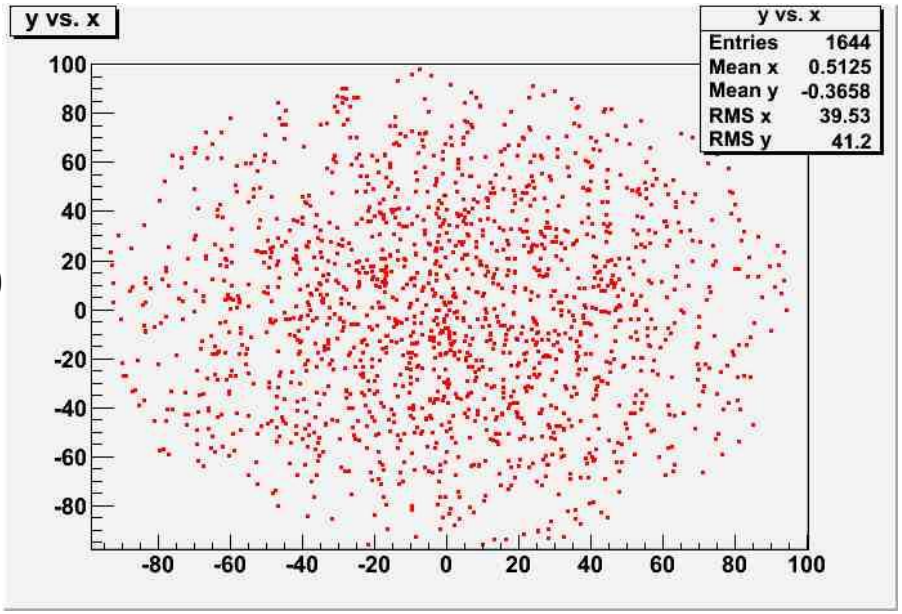
Aluminum (Z=13)

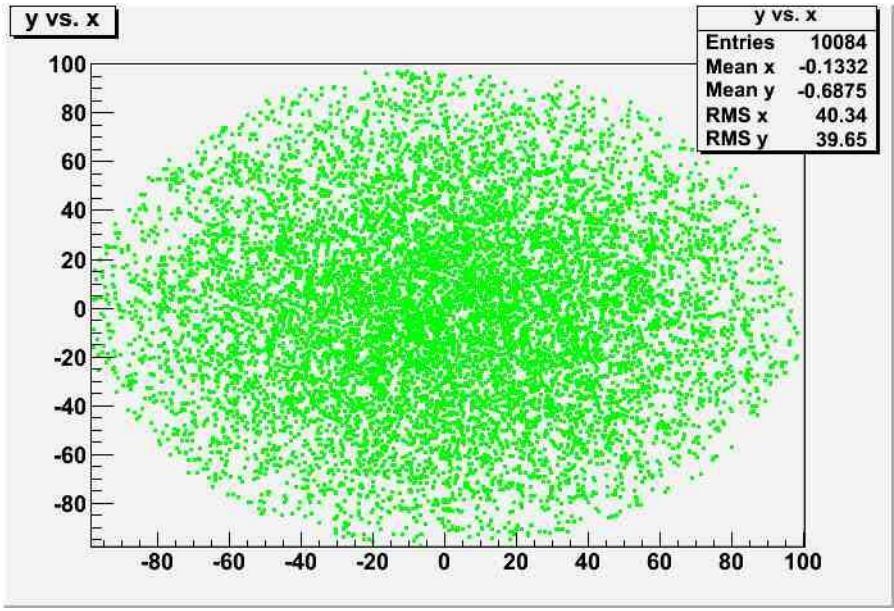
Pz>0





Pz<0

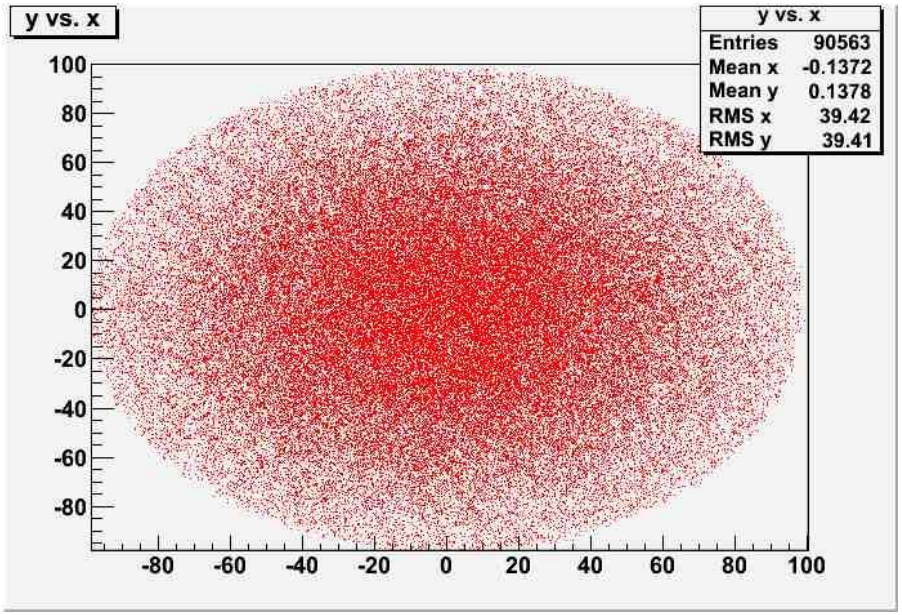


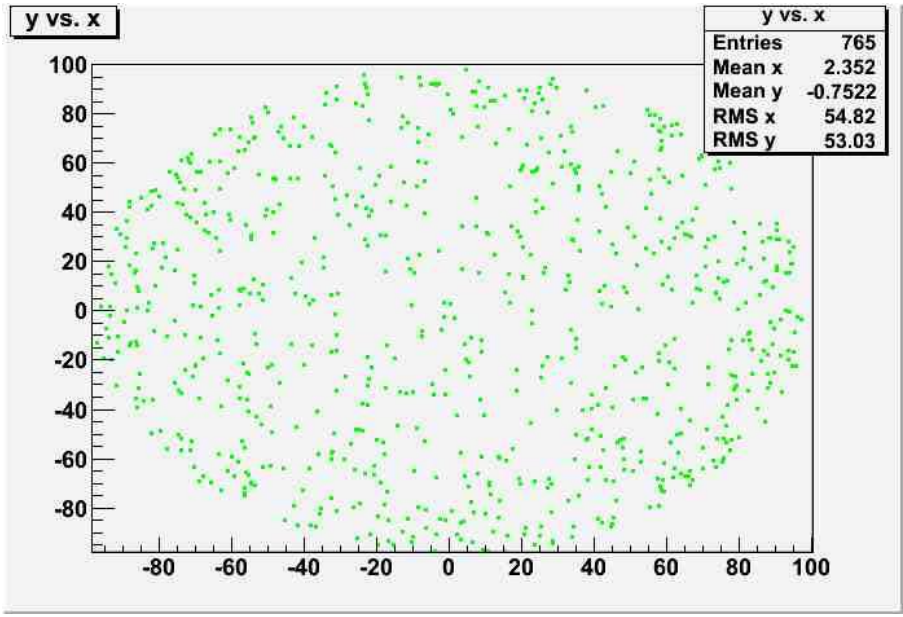


1 mm upstream of Dump

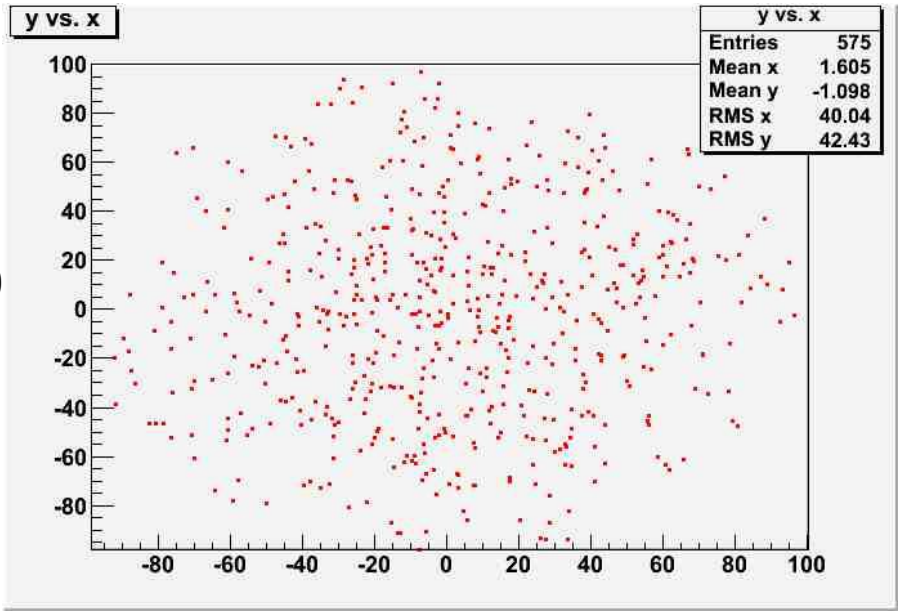
Carbon (Z=6)

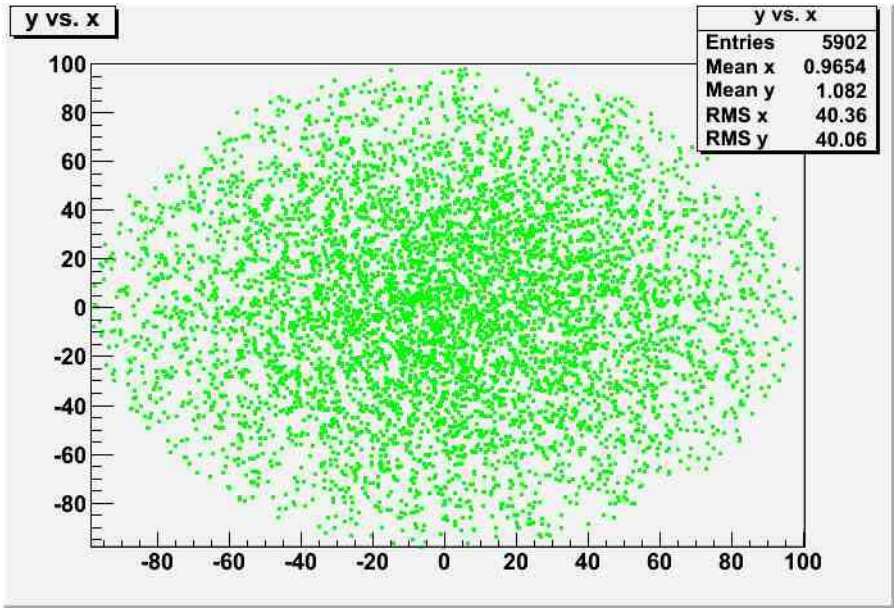
Pz>0





Pz<0

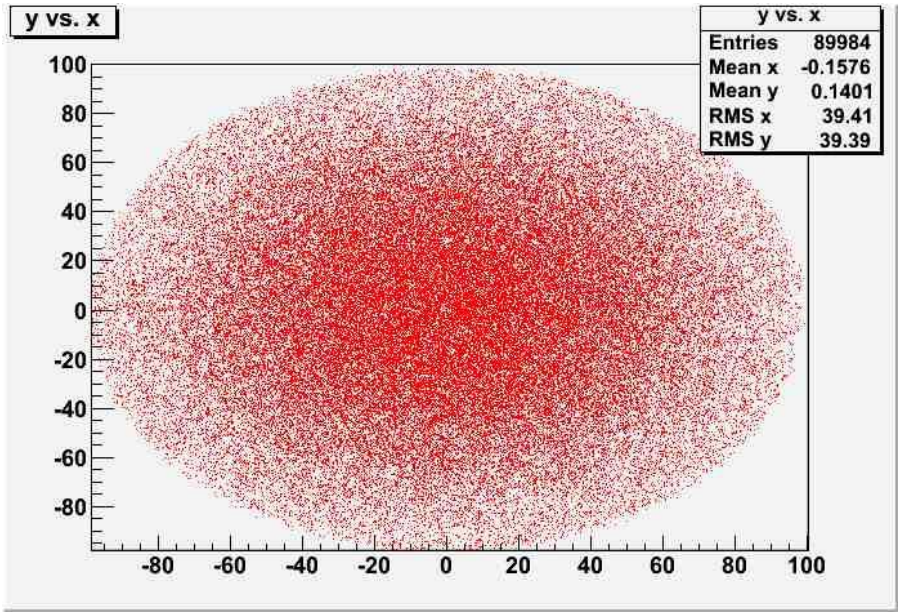


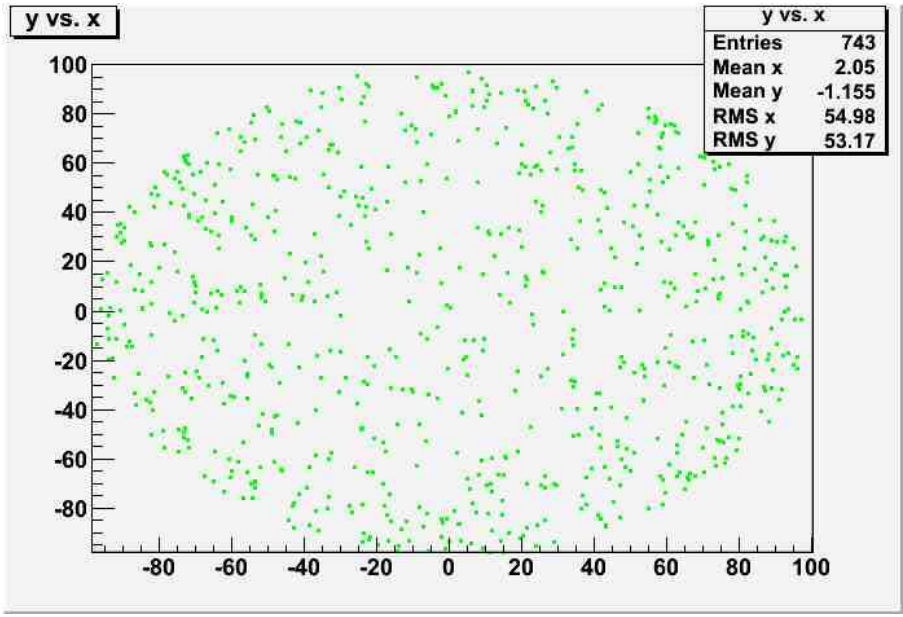


1 mm upstream of Dump

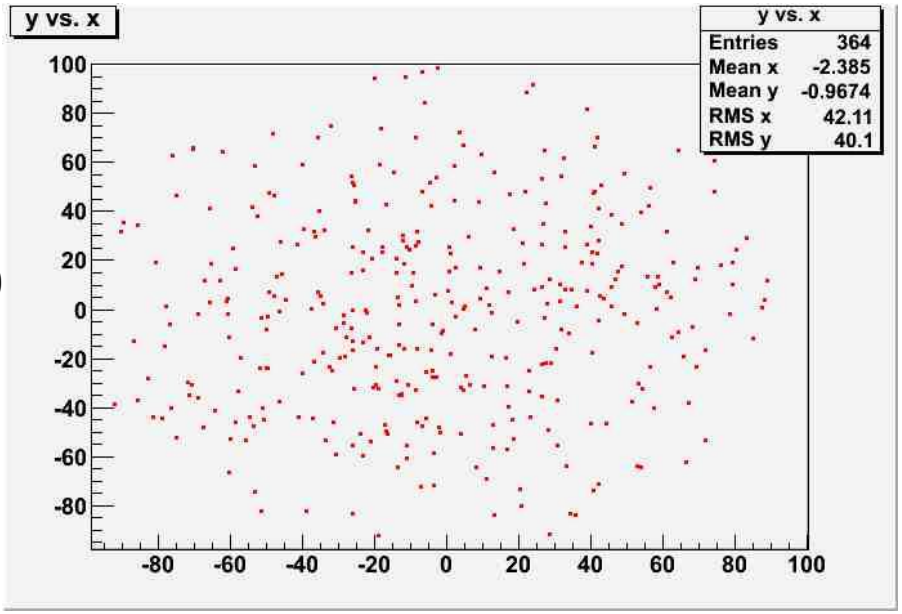
Beryllium (Z=4)

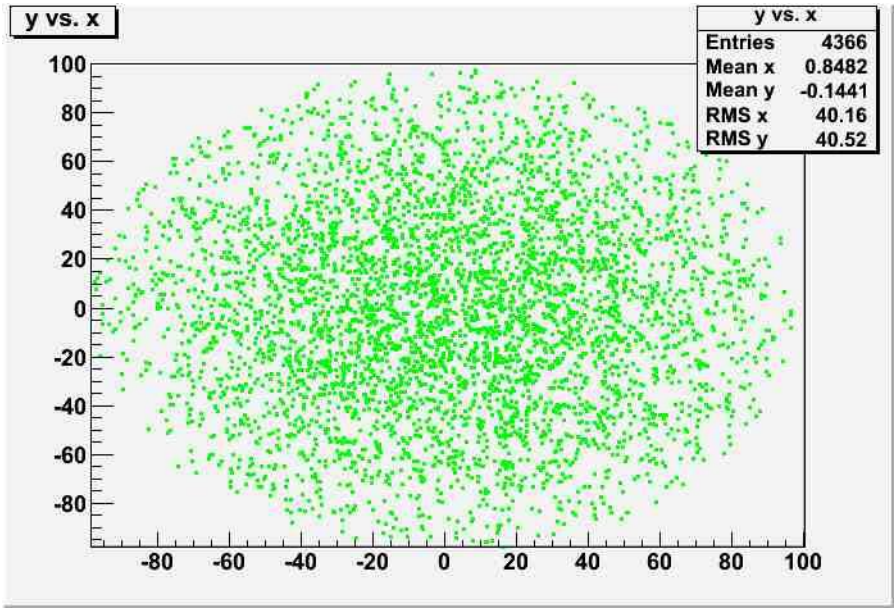
Pz>0





Pz<0

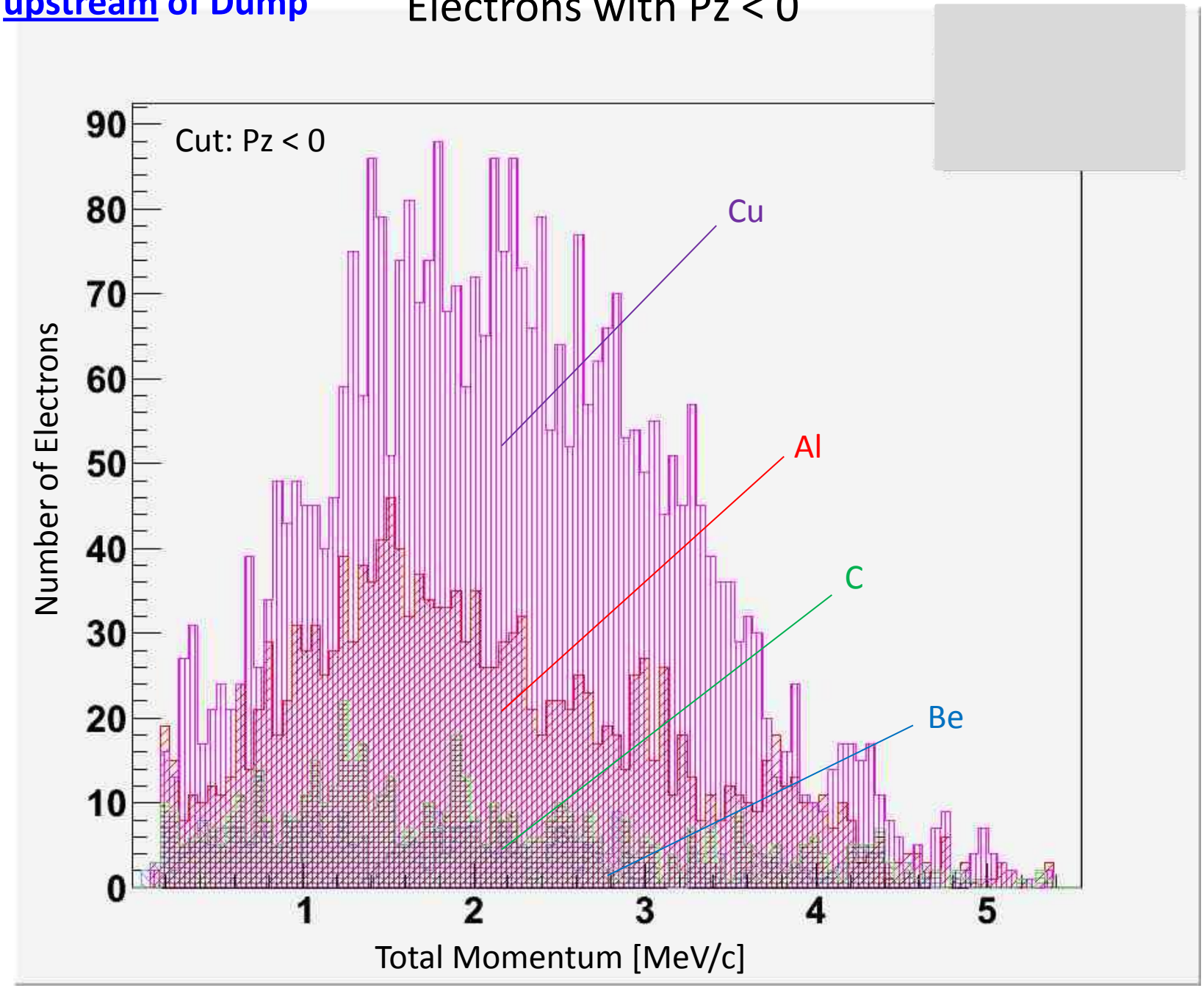




Electron and photon momentum distributions in front of dump returning toward target

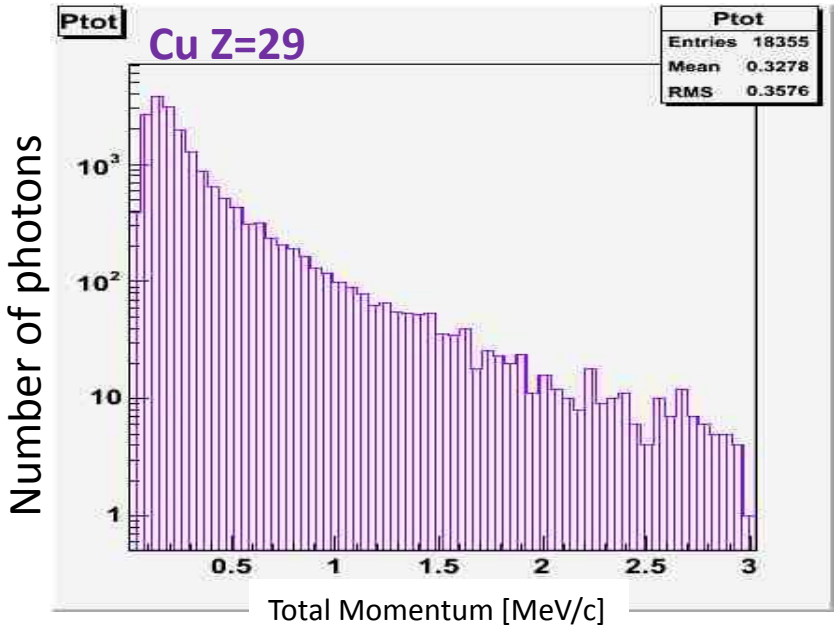
1 mm upstream of Dump

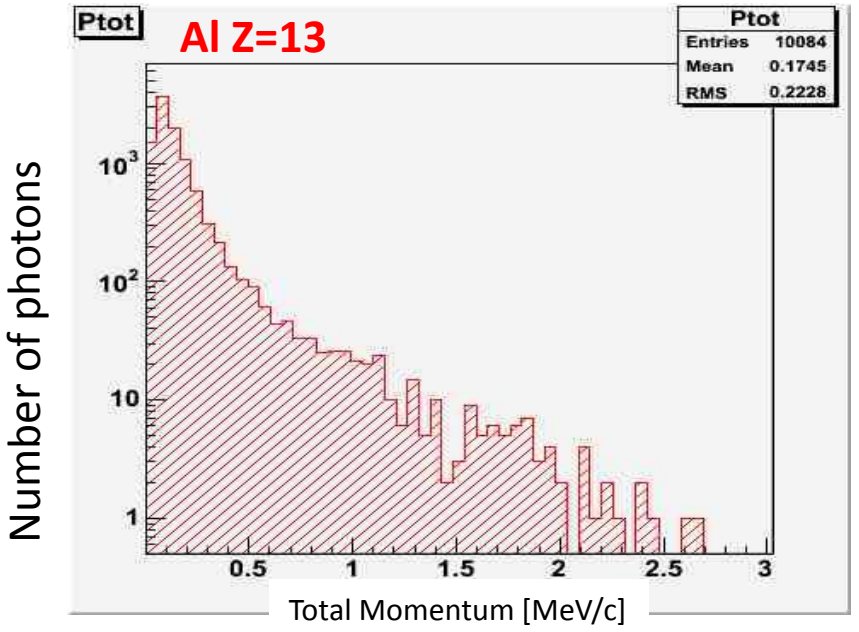
Electrons with Pz < 0

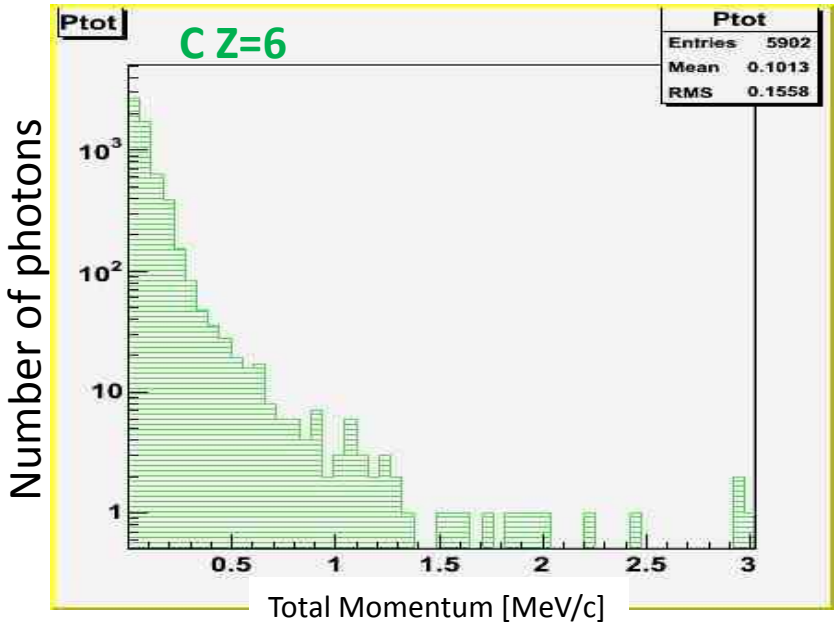


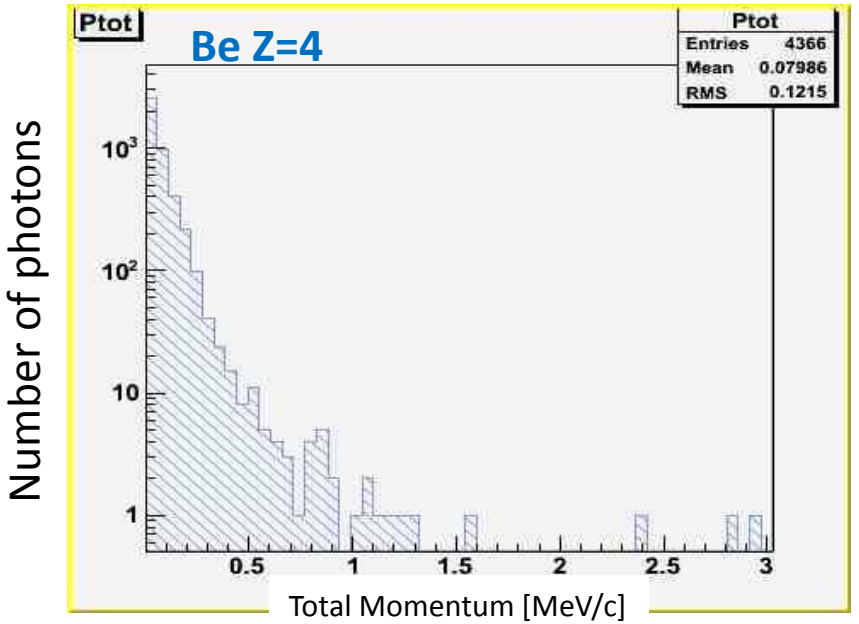
1 mm upstream of Dump

Photons with Pz < 0





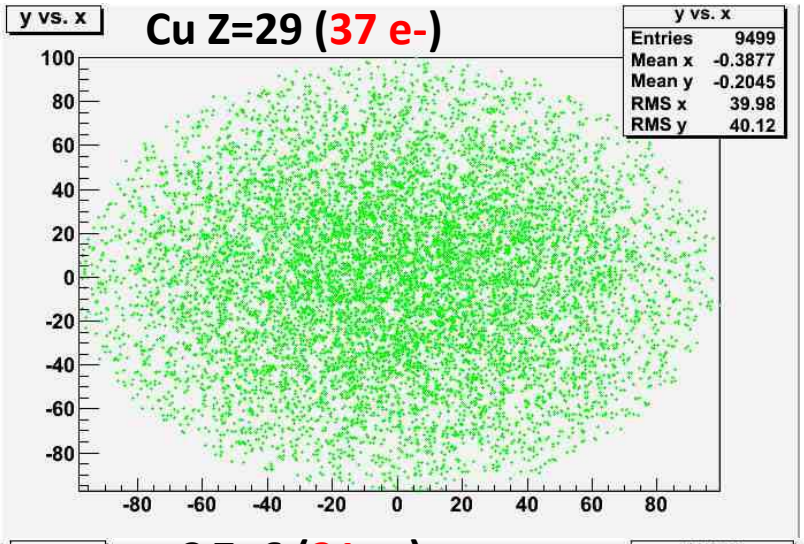


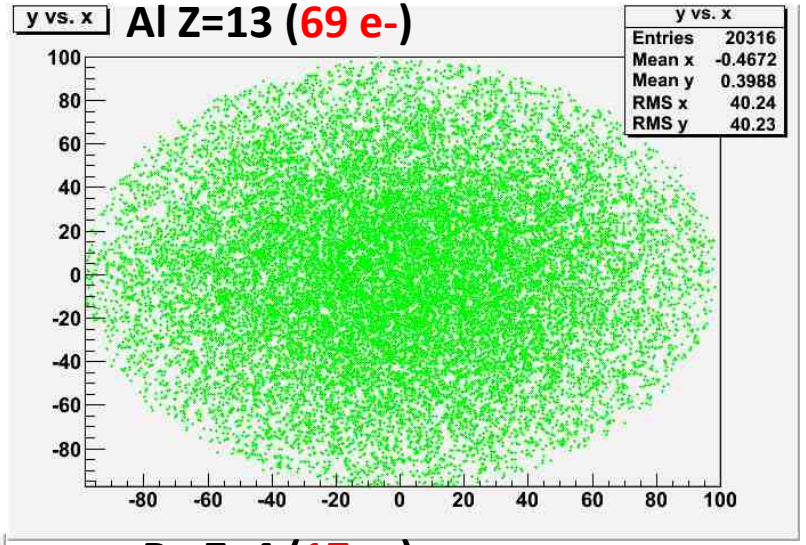


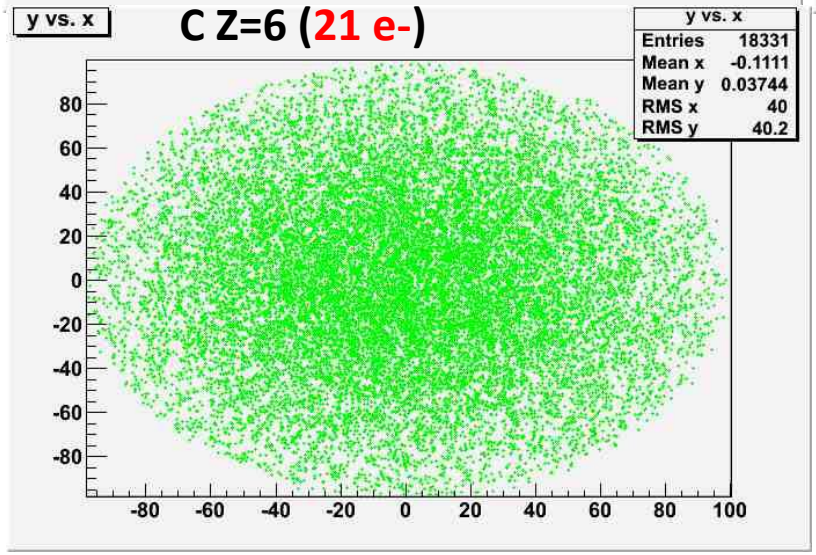
Electron and photon spatial distributions exiting downstream of dump

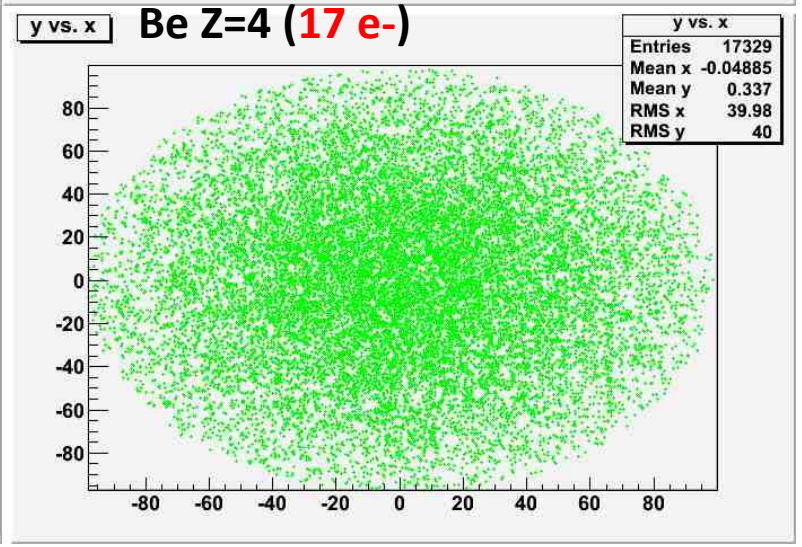
1 mm downstream of Dump

Pz > 0 (no events with Pz < 0)









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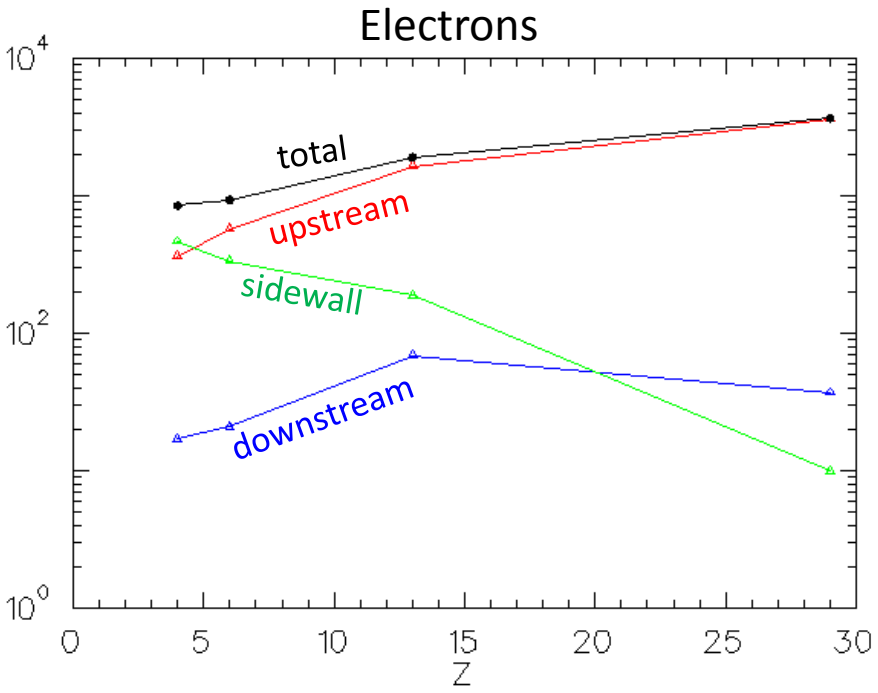
radial edge of Dump

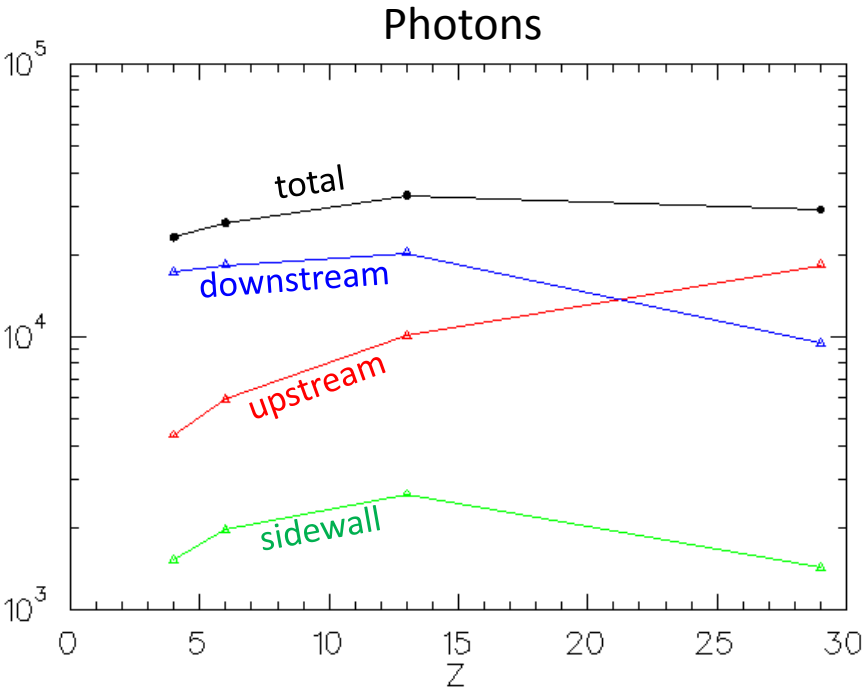
	Cu	Al	C	Be
e-	10	189	337	466
γ	1428	2649	1966	1521

Response versus Z

Electrons and Photons traversing surfaces about 1mm outside of a 1” dump flange

- upstream means returning from dump
- downstream means exiting dump
- sidewall means exiting OD surface



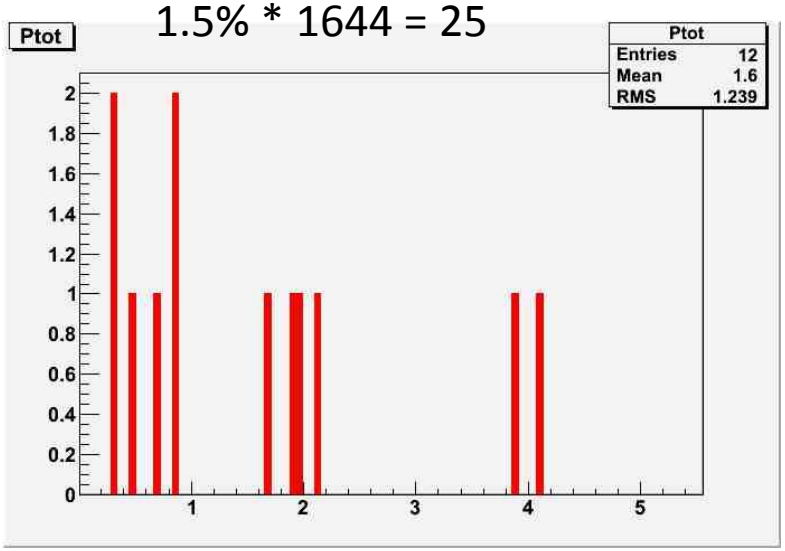


Electron and photon back-illuminating target plane

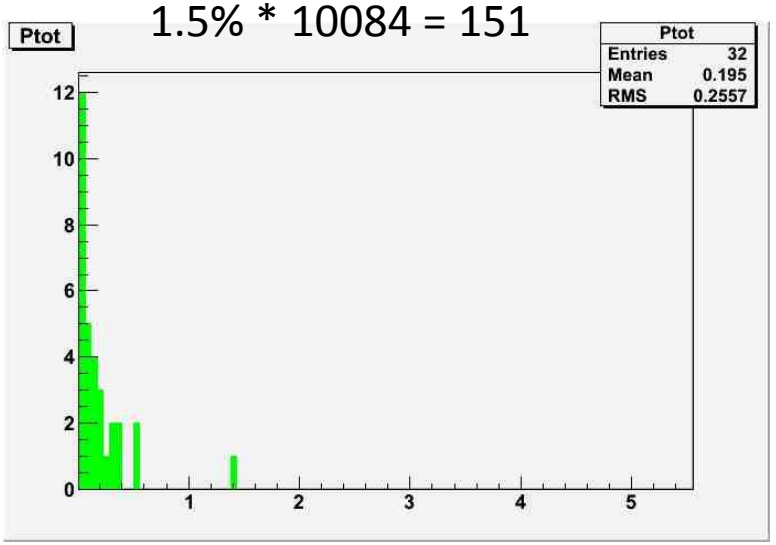
So, what reaches the target plane ?

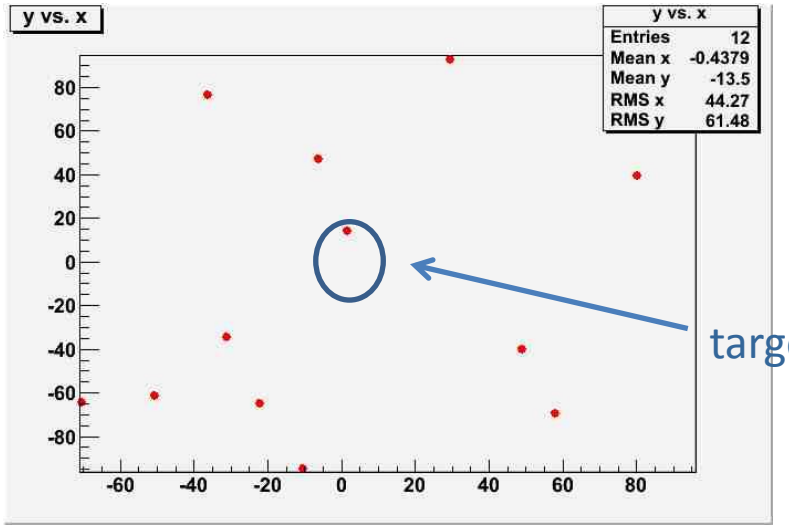
Assuming “illuminous dump” is uniform in backward 2pi then 324cm^2 detector plane 1.8m from dump represents 1.5% angular acceptance. Testing for Aluminum…

1.5% * 1644 = 25

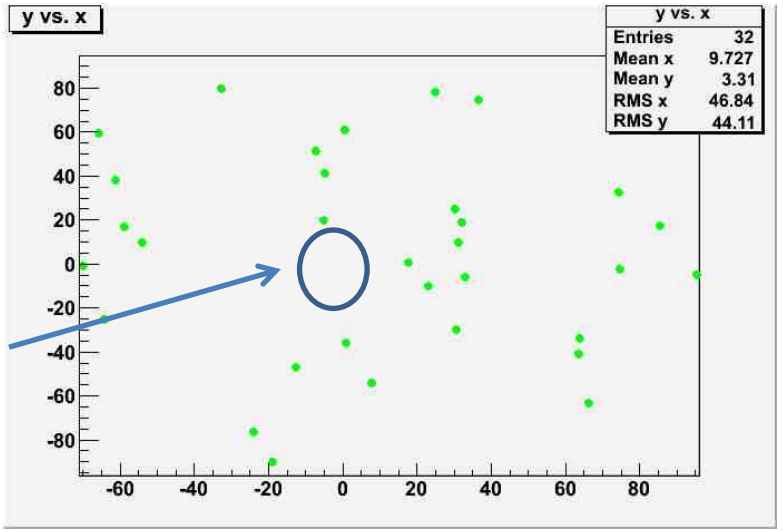


1.5% * 10084 = 151





target



Summary

1. C or Be are similar, both better than Al and by
   - about 3-4 for e-
   - about 2-3 for photons

2. Cu is better absorber of gamma by factor of about 2
   - Could be a good backing material, but should not be proud in chamber

3. Simulation rates fine for characterizing dump; poor for back-illuminate target
   - 10^5 target events (per second) is 16nA or 10^6 overnight still low stat
   - Target – Dump distance is about 1.8m so need to bias simulation

1. More realistic model will be helpful
   - Use a reasonable e- beam distribution
   - Verify multiple-scattering distribution
   - Include dump dipole
   - About 90% of e- reach the dump, so more careful detail on surfaces
   - Figure out how to integrate deposited energy using G4Beamline