BAFFLE STUDIES

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Oct 29 2013 SoLID Meeting

- 5e6 electrons on target
- 11 layer BaBar style baffles, beamline — kryptonite and lead/aluminum
- Usual plots for photons crossing 4th (of 4) GEMs and statistics for photons, electrons crossing all 4:

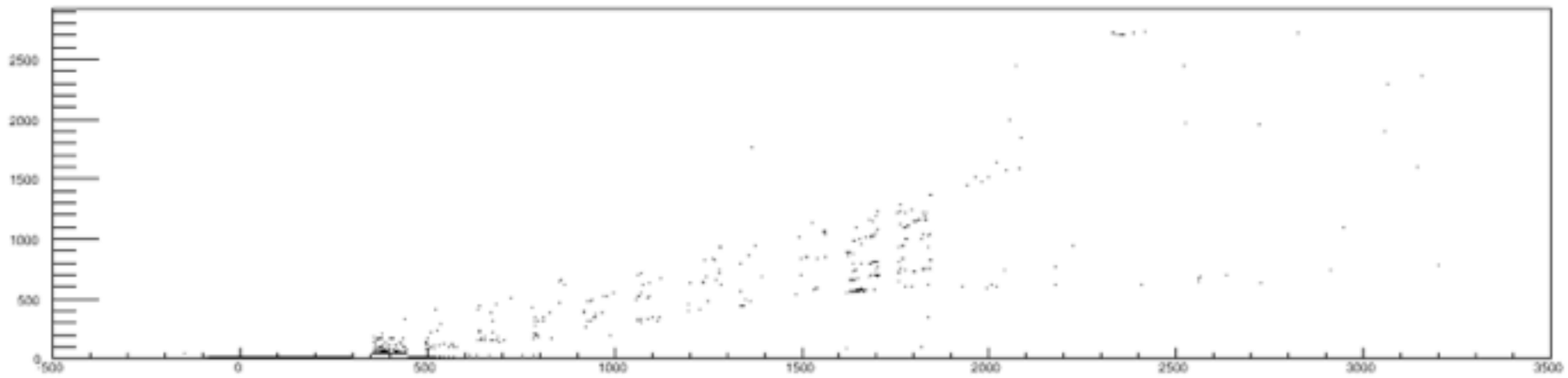
Lead baffles, Al beam pipe:

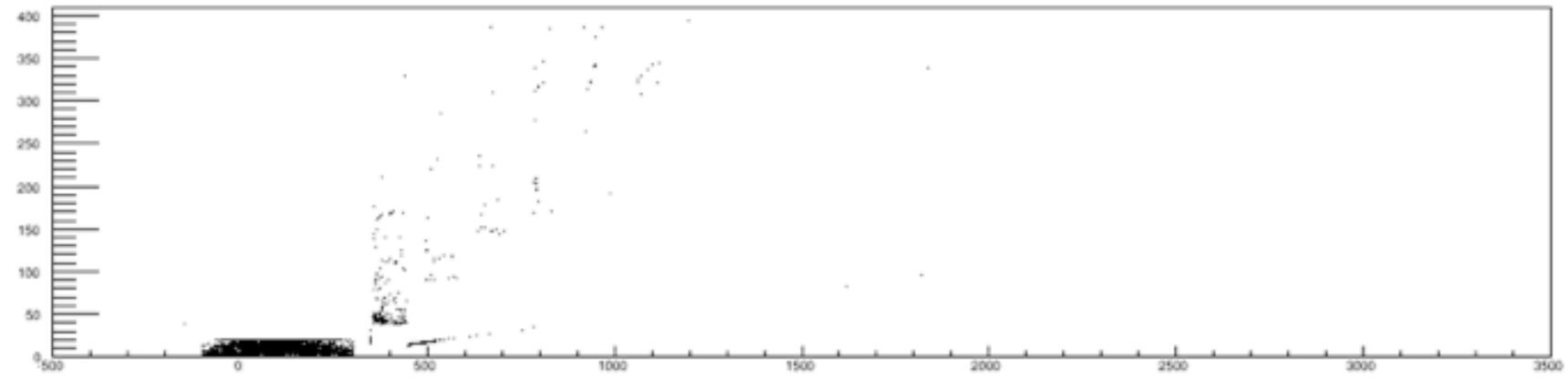
	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	16643	15183	124	0.75
Plane 2	9422	8346	54	0.57
Plane 3	7785	7091	67	0.86
Plane 4	7568	6887	61	0.81

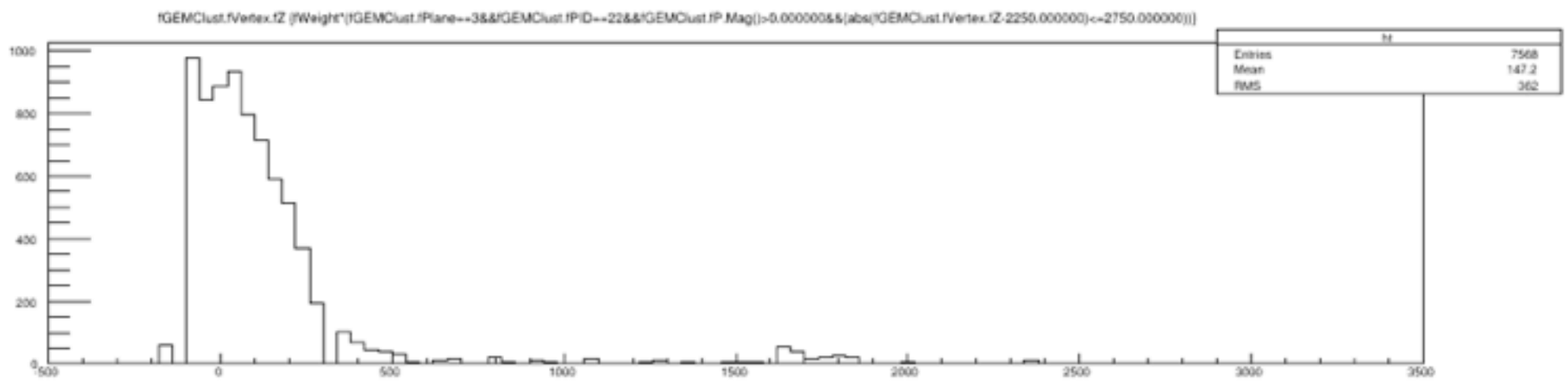
Kryptonite baffles and beam pipe:

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	13468	13468	53	0.39
Plane 2	7073	7056	42	0.59
Plane 3	6138	6130	51	0.83
Plane 4	5914	5904	32	0.54

Vertices for BG photons, GEM 4 Lead BaBar 11

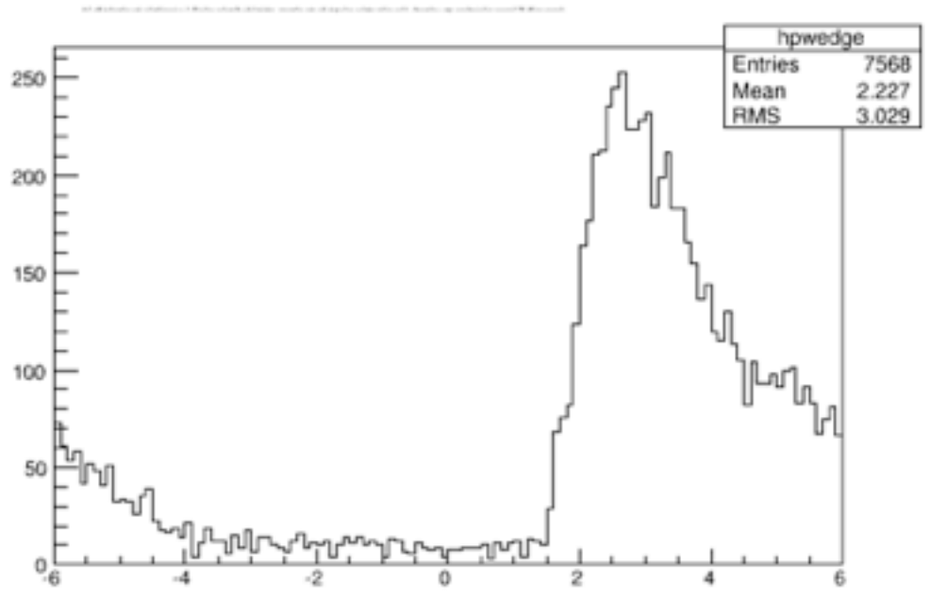




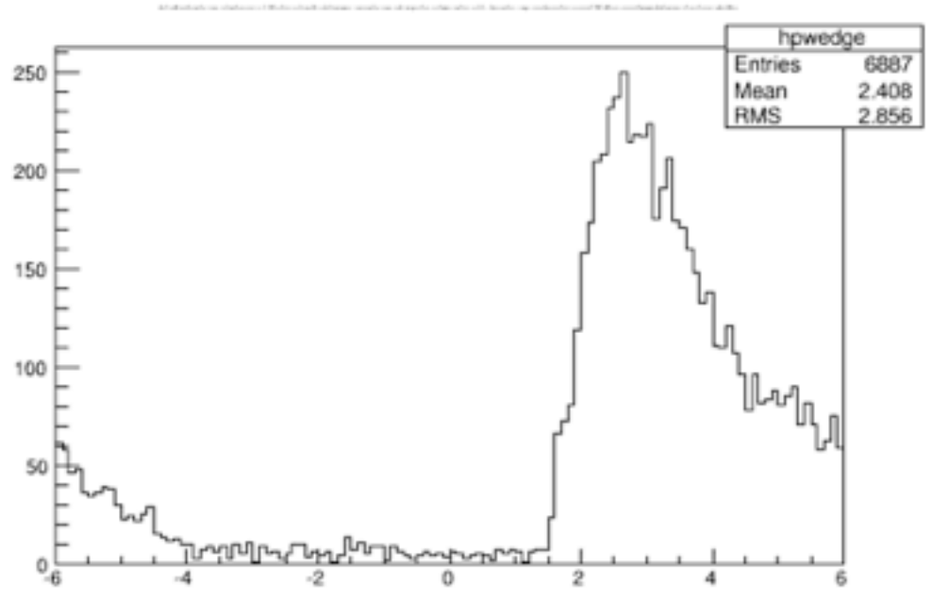


Hit phi for BG photons, GEM 4 Lead BaBar 11

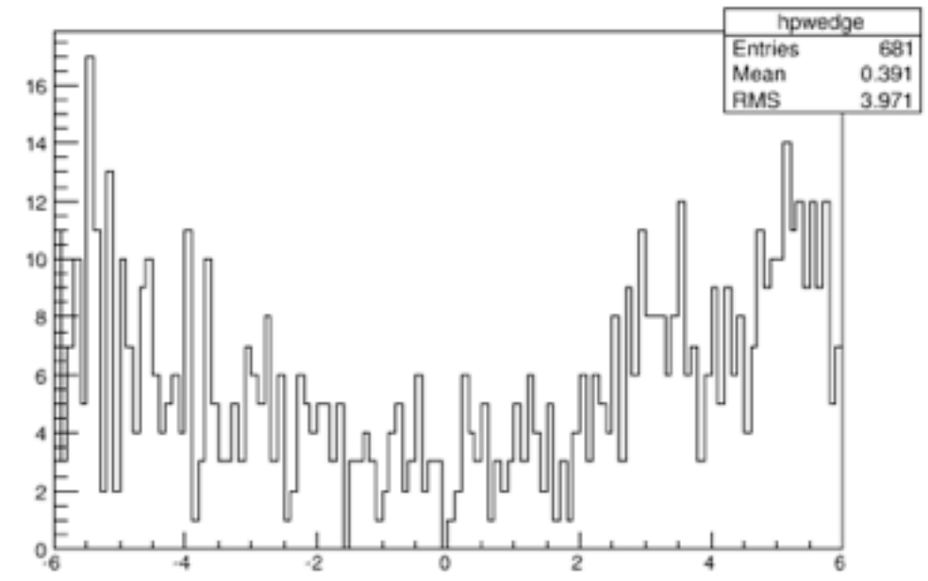
All vertices



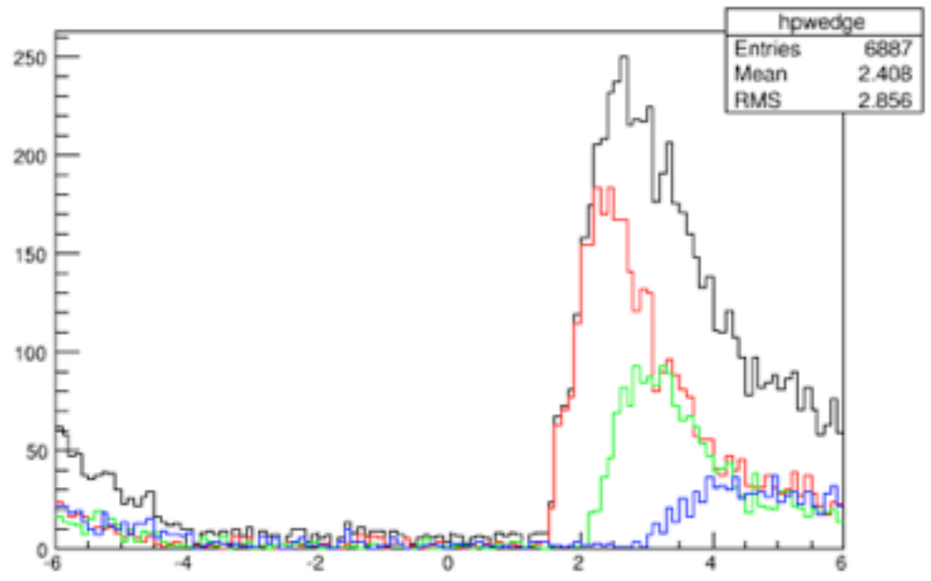
From target



From downstream

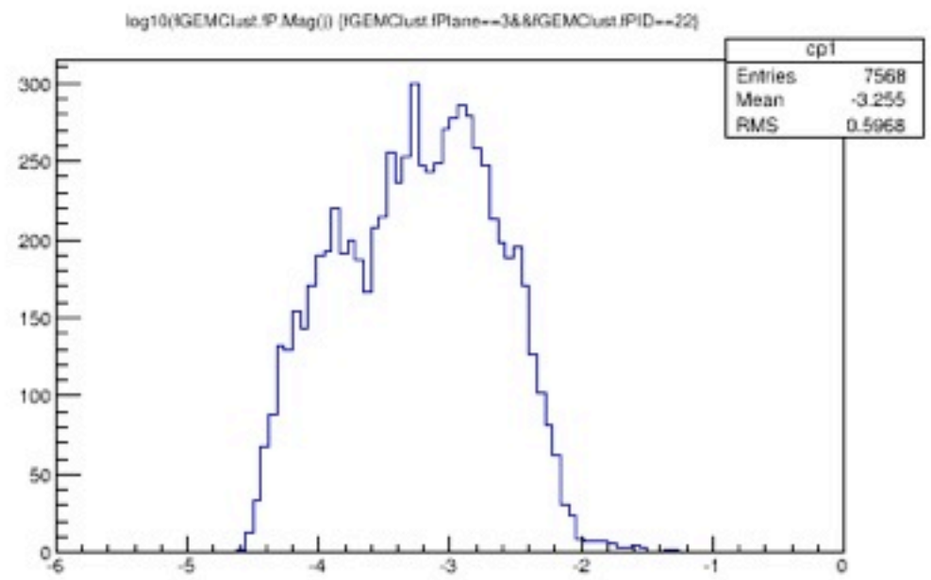


From target (radial cuts)

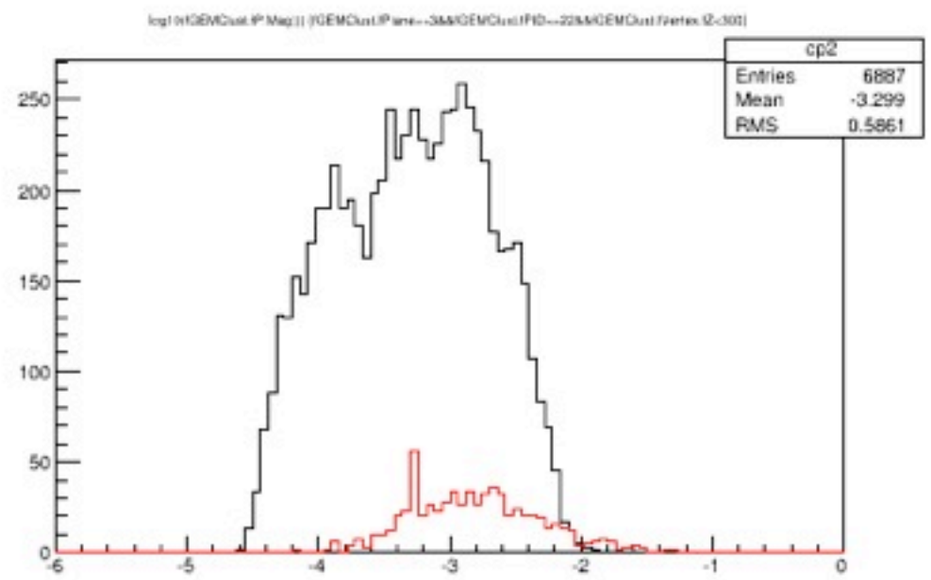


Momentum magnitude and direction Lead BaBar 11

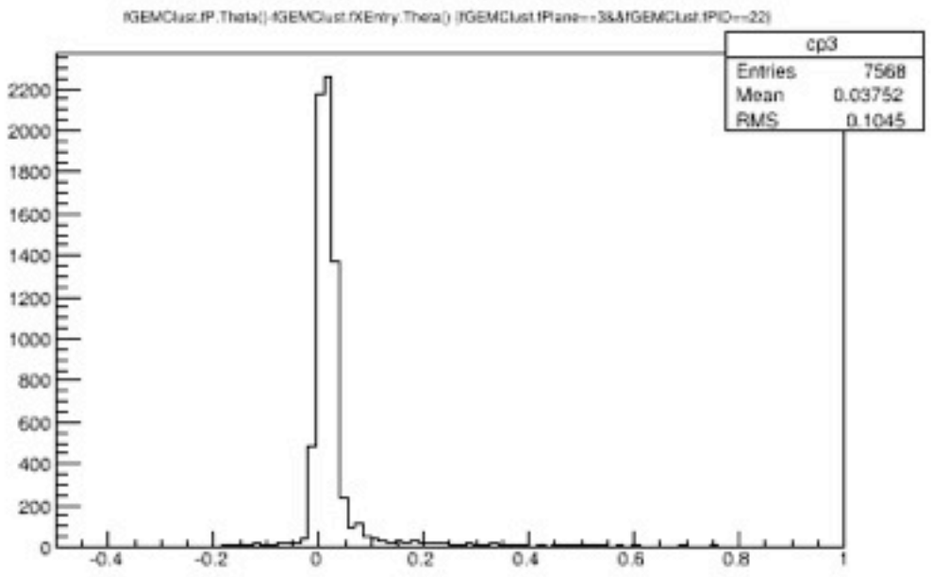
Log momentum (all)



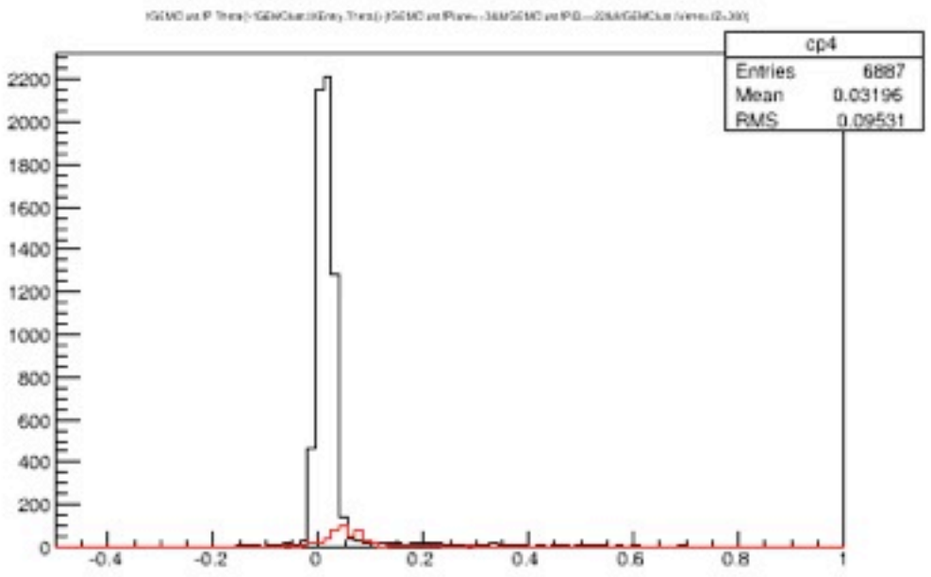
Log momentum (target black, downst. red)



Polar direction (all)

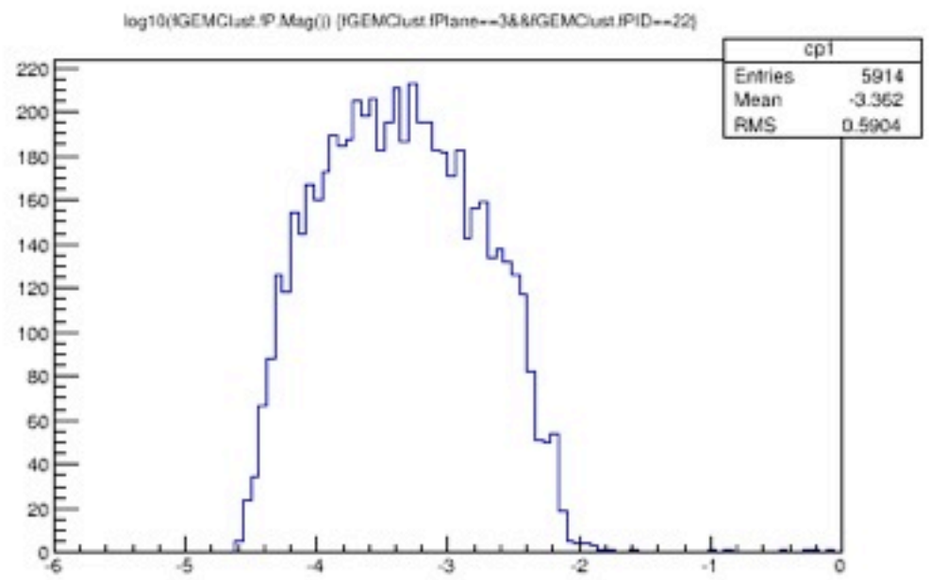


Polar direction (target black, downst. red)

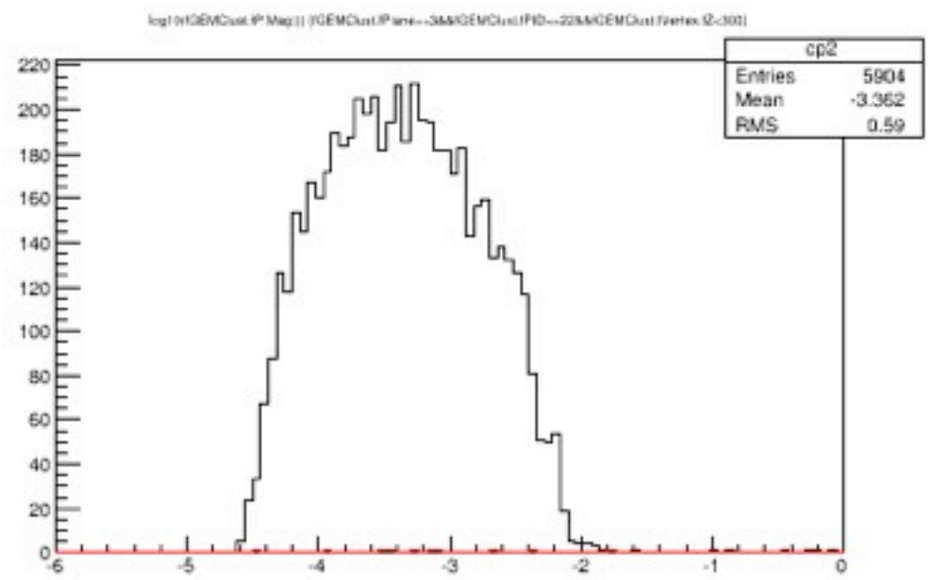


Momentum magnitude and direction Krypto BaBar 11

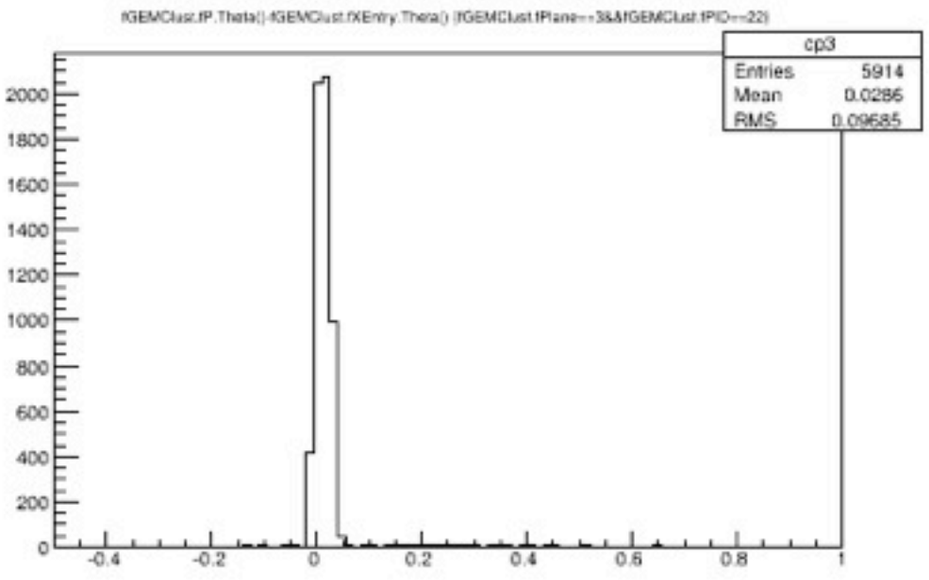
Log momentum (all)



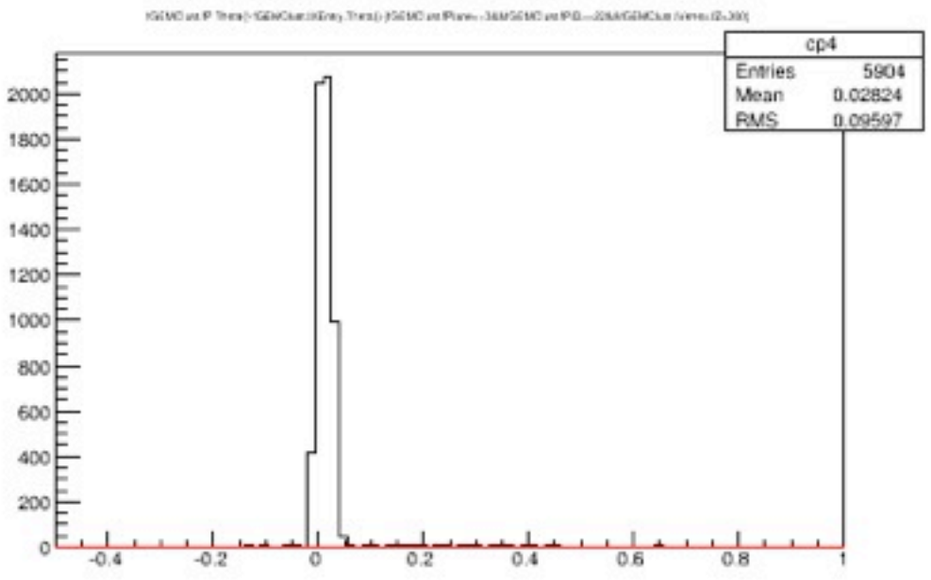
Log momentum (target black, downst. red)



Polar direction (all)



Polar direction (target black, downst. red)



- 25e6 electrons on target (note 5x statistics)
- New "3.5°" baffles, wide beamline — lead/ aluminum (kryptonite in progress)
- Usual plots for photons crossing 4th (of 4) GEMs and statistics for photons, electrons crossing all 4:

Lead baffles, Al beam pipe:

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	55702	49530	593	1.1
Plane 2	35500	29680	431	1.2
Plane 3	29965	25531	175	0.58
Plane 4	28562	24339	233	0.82

BG AND e- EFFICIENCY

Real baffles & beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	34483	18488	307	0.89
Plane 2	15619	6846	193	1.2
Plane 3	9820	5046	120	1.2
Plane 4	9399	4822	103	1.1

Krypt baffles, real beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	24514	15849	99	0.4
Plane 2	8798	4919	59	0.67
Plane 3	5024	3550	36	0.72
Plane 4	4793	3418	32	0.67

Real baffles, krypt beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	19947	15831	129	0.65
Plane 2	8725	5866	119	1.4
Plane 4	5396	3912	58	1.1

Real baffles, real wide beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	22775	17814	228	1
Plane 2	10075	6479	114	1.1
Plane 3	7363	5152	69	0.94
Plane 4	7068	4944	76	1.1

Real baffles, krypt wide beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	21276	17349	166	0.78
Plane 2	9038	6102	132	1.5
Plane 3	6597	4841	40	0.61
Plane 4	6394	4671	64	1

Krypt baffles & beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	15965	15495	91	0.57
Plane 2	4635	4566	25	0.54
Plane 3	3436	3401	15	0.44
Plane 4	3314	3281	15	0.45

Real baffles, no inner ring, real wide beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	22702	18505	192	0.85
Plane 2	9733	6711	106	1.1
Plane 3	7156	5359	67	0.94
Plane 4	6869	5117	75	1.1

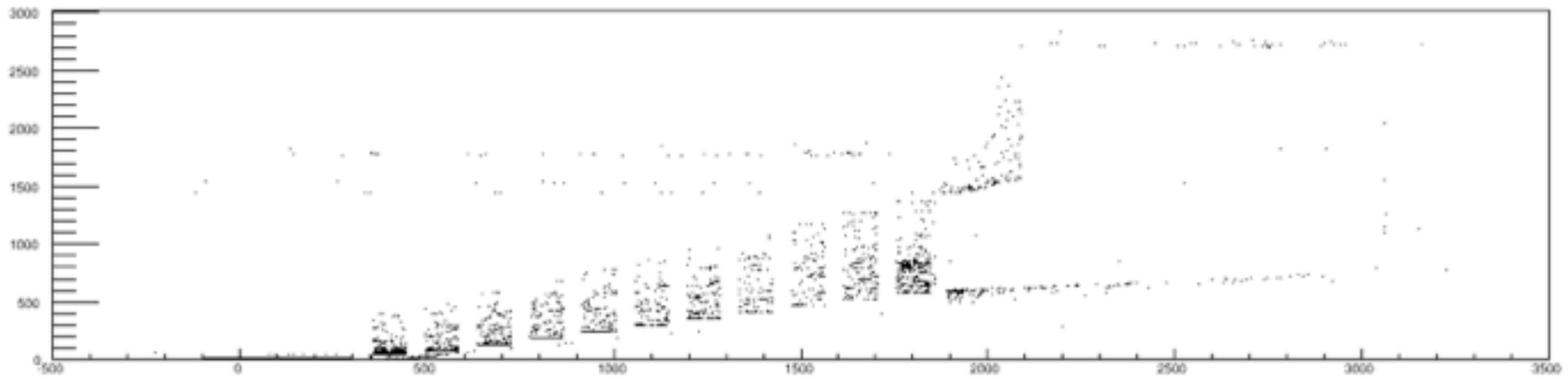
Krypt 1st baffle, no inner ring, real wide beamline

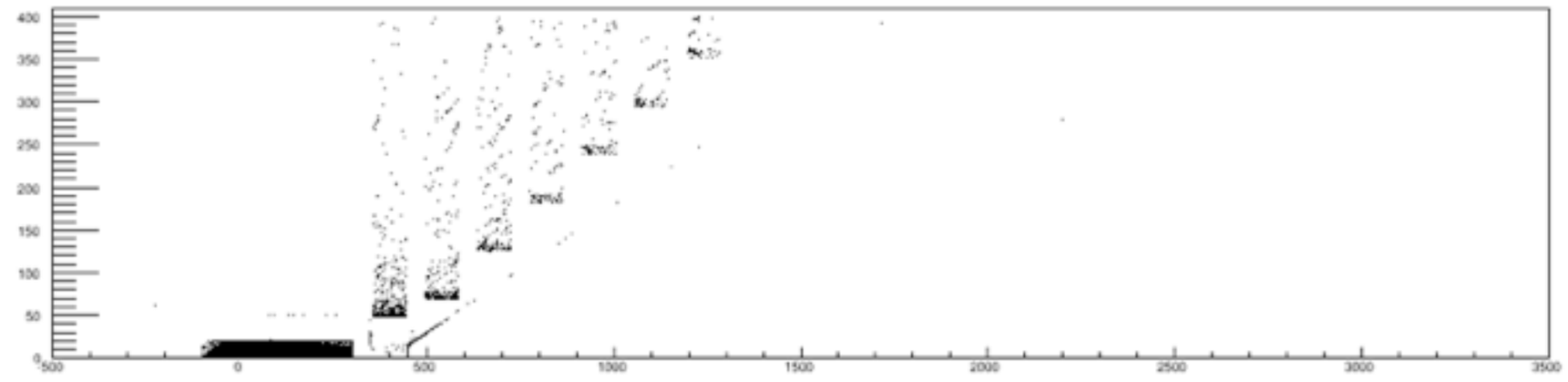
	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	19377	17557	191	0.99
Plane 2	7474	6116	101	1.4
Plane 3	5543	4755	38	0.69
Plane 4	5286	4539	48	0.91

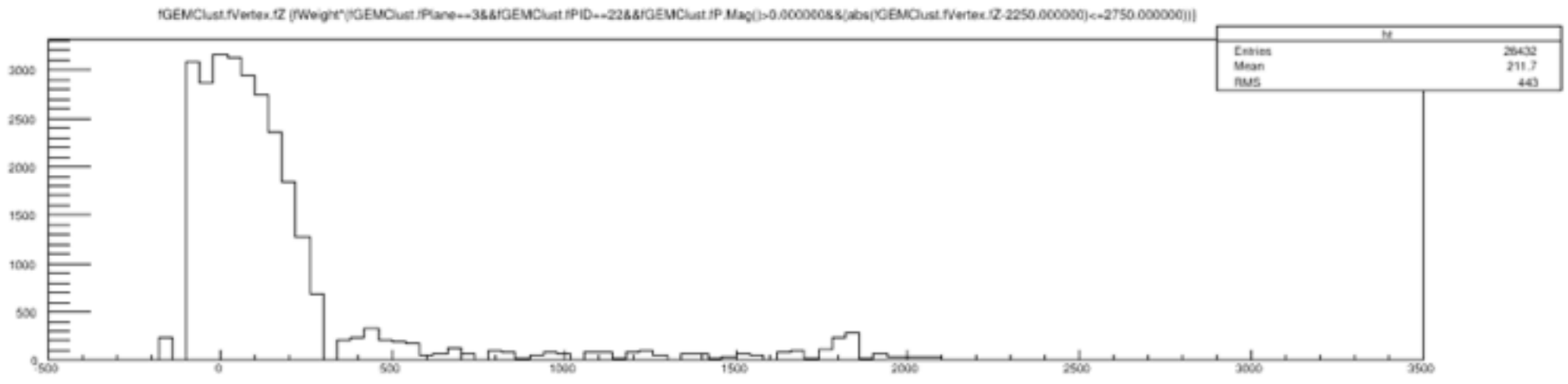
Krypt 1st baffle, no inner ring, tungsten baffles, real wide beamline

	gamma (all)	gamma (targ)	e-	eff (%)
Plane 1	18677	17169	120	0.64
Plane 2	6856	5852	96	1.4
Plane 3	5262	4690	34	0.65
Plane 4	5021	4474	38	0.76

Vertices for BG photons, GEM 4 3.5 deg lead baffles, wide beamline

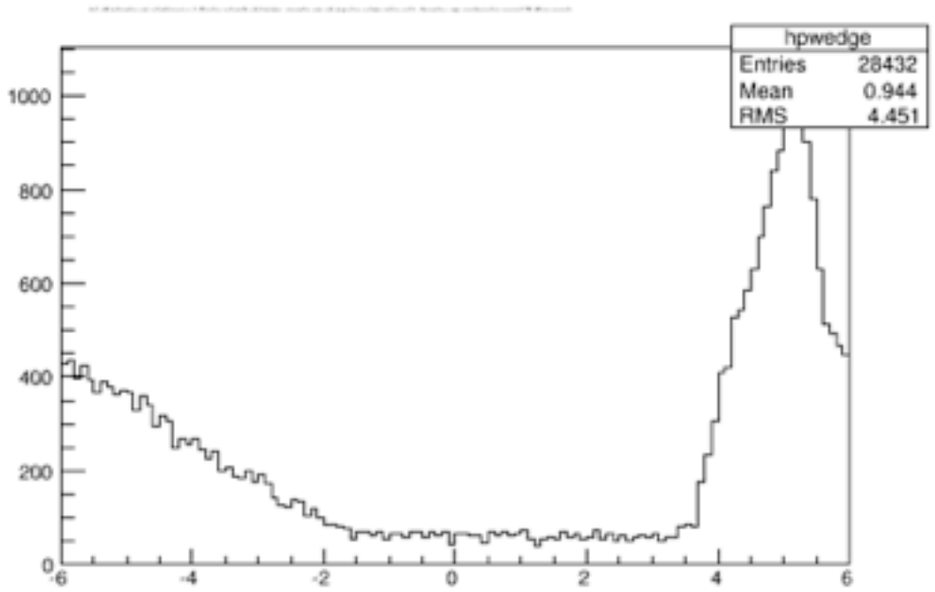




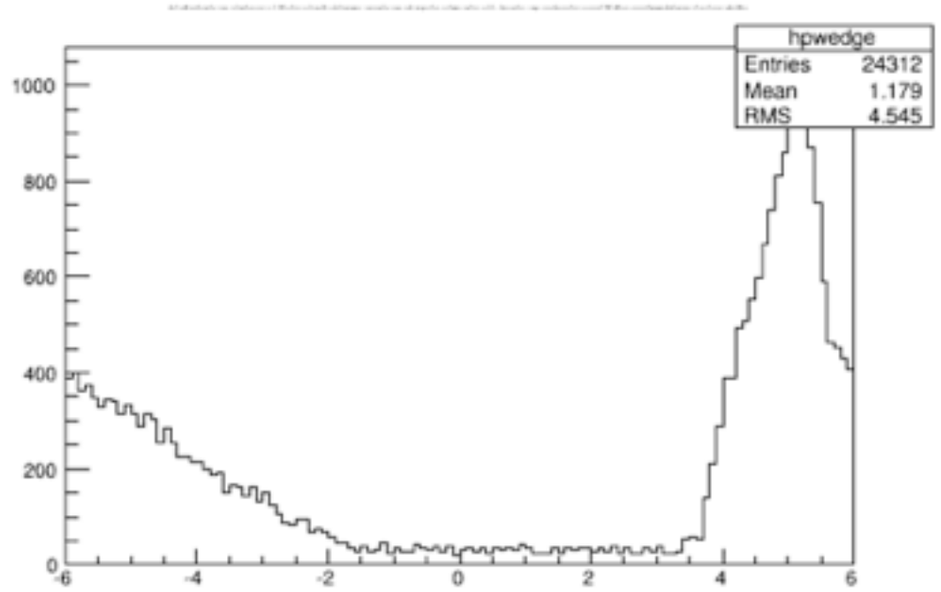


Hit phi for BG photons, GEM 4 3.5 deg lead baffles, wide beamline

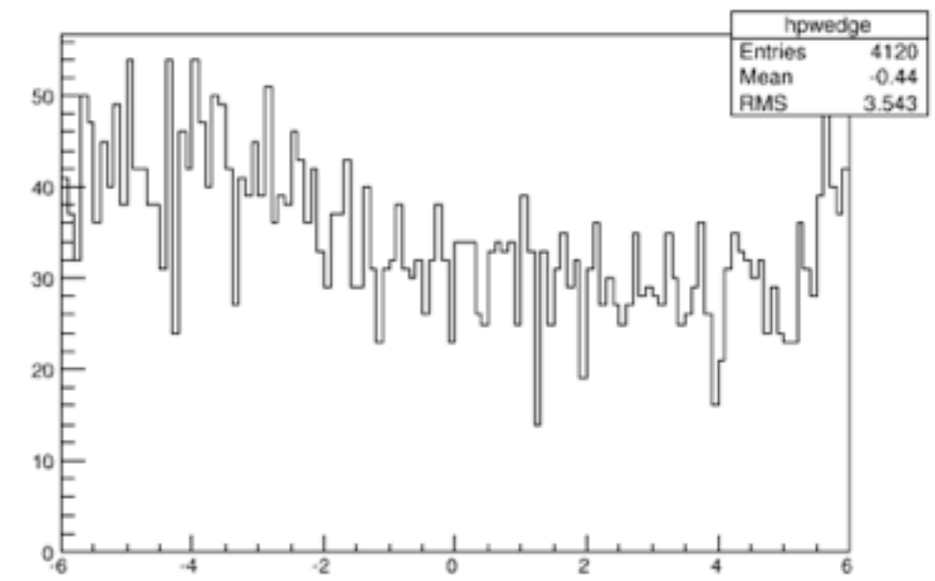
All vertices



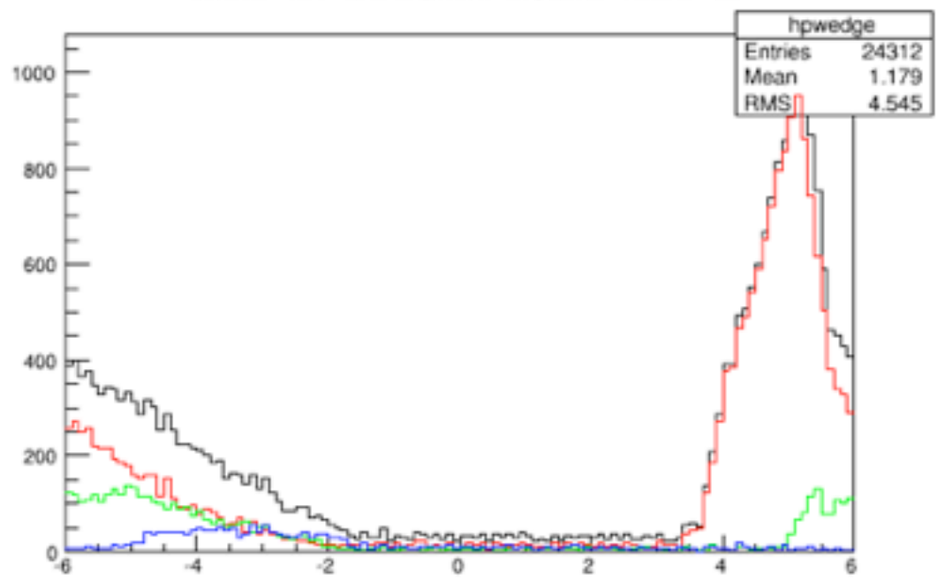
From target



From downstream

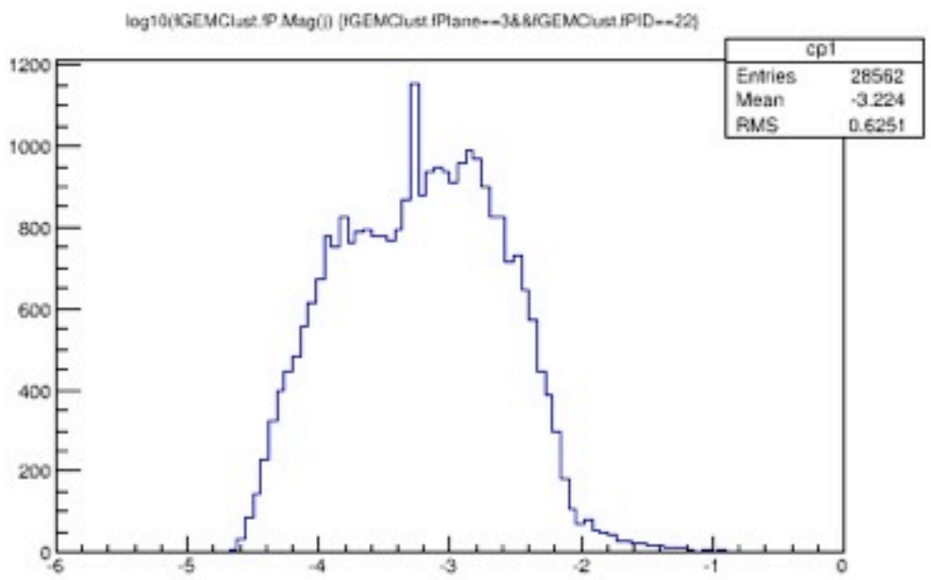


From target (radial cuts)

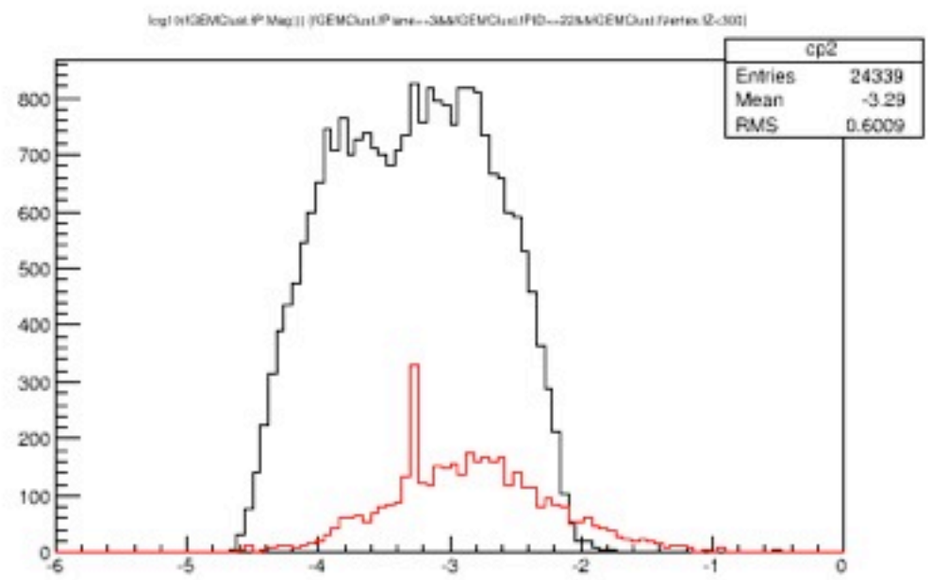


Momentum magnitude and direction 3.5 deg lead baffles, wide beamline

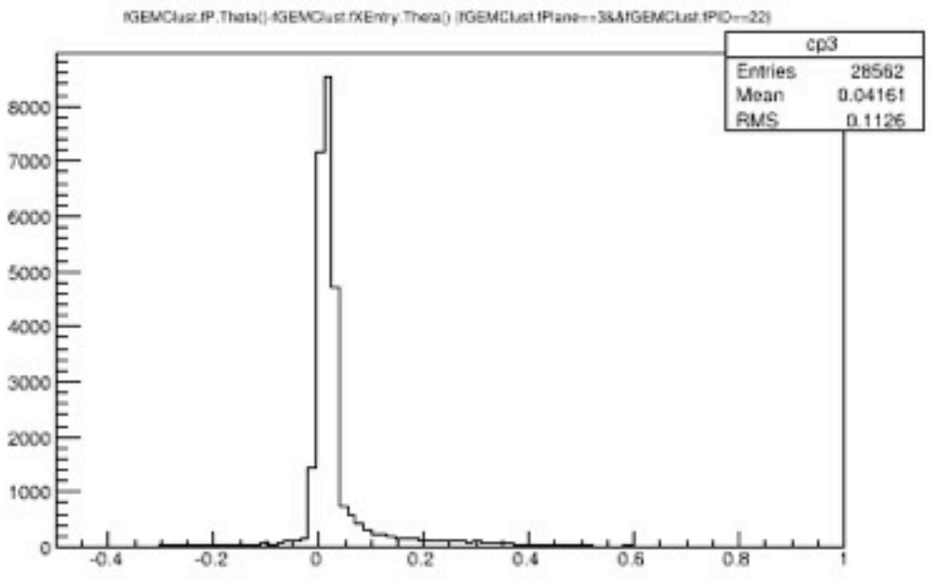
Log momentum (all)



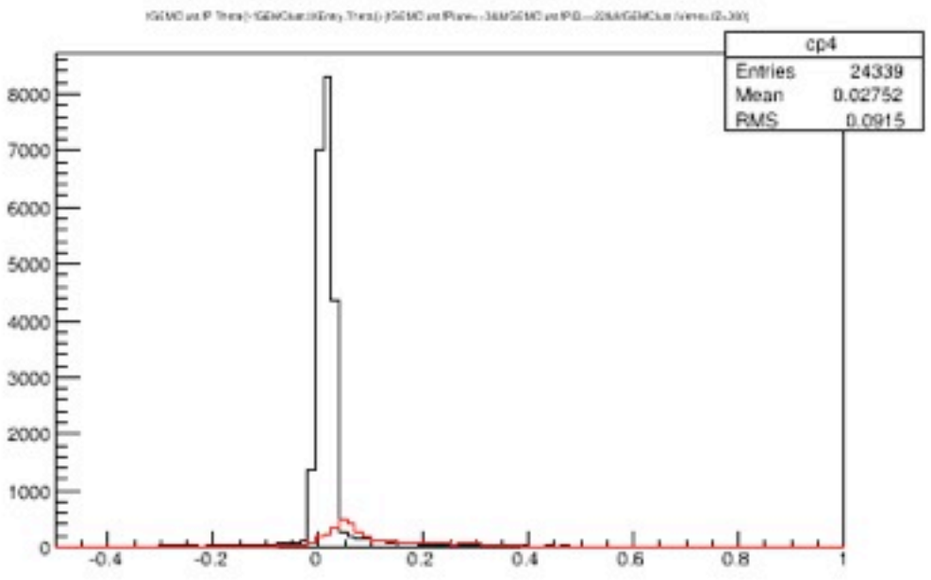
Log momentum (target black, downst. red)



Polar direction (all)



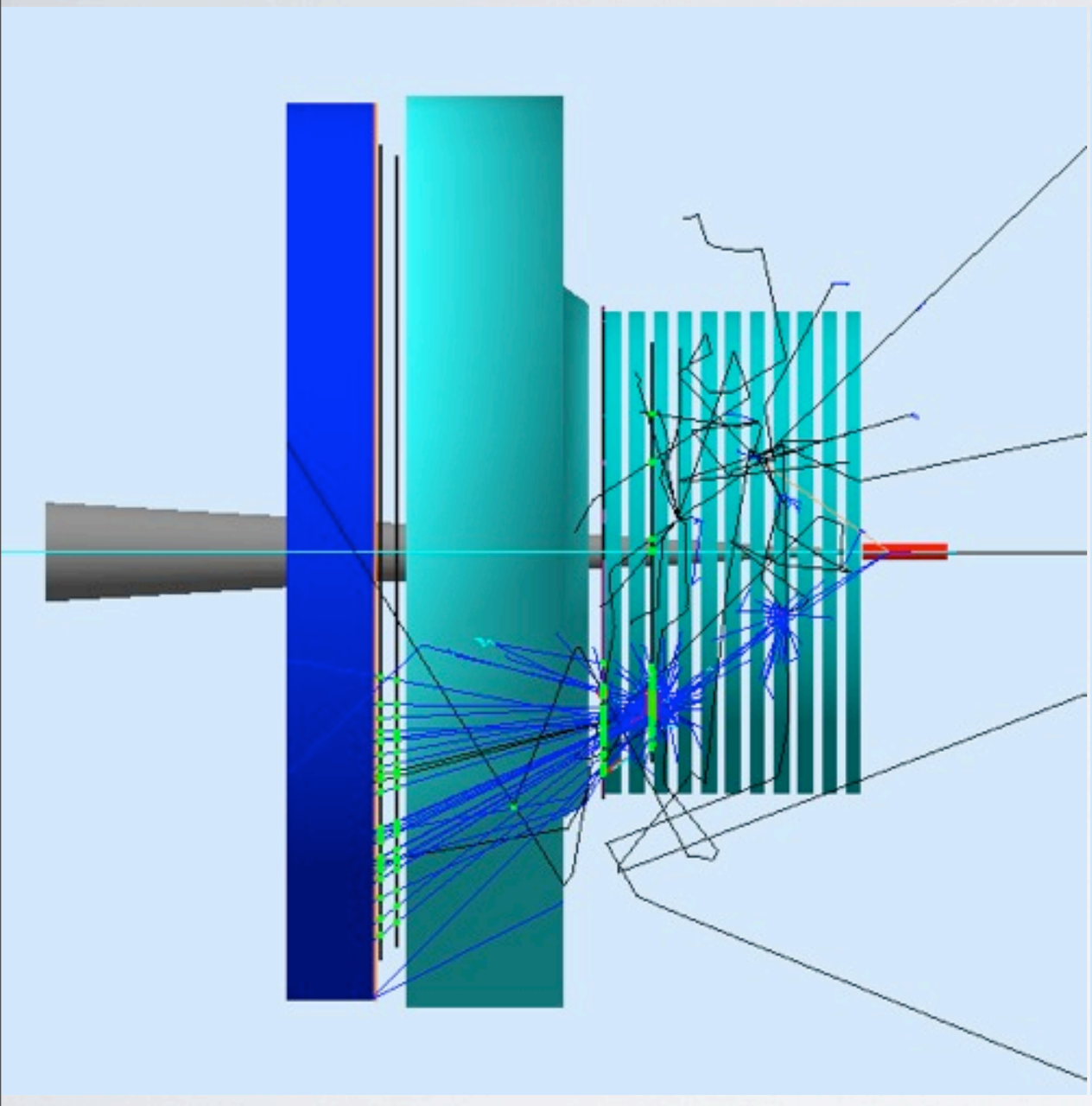
Polar direction (target black, downst. red)

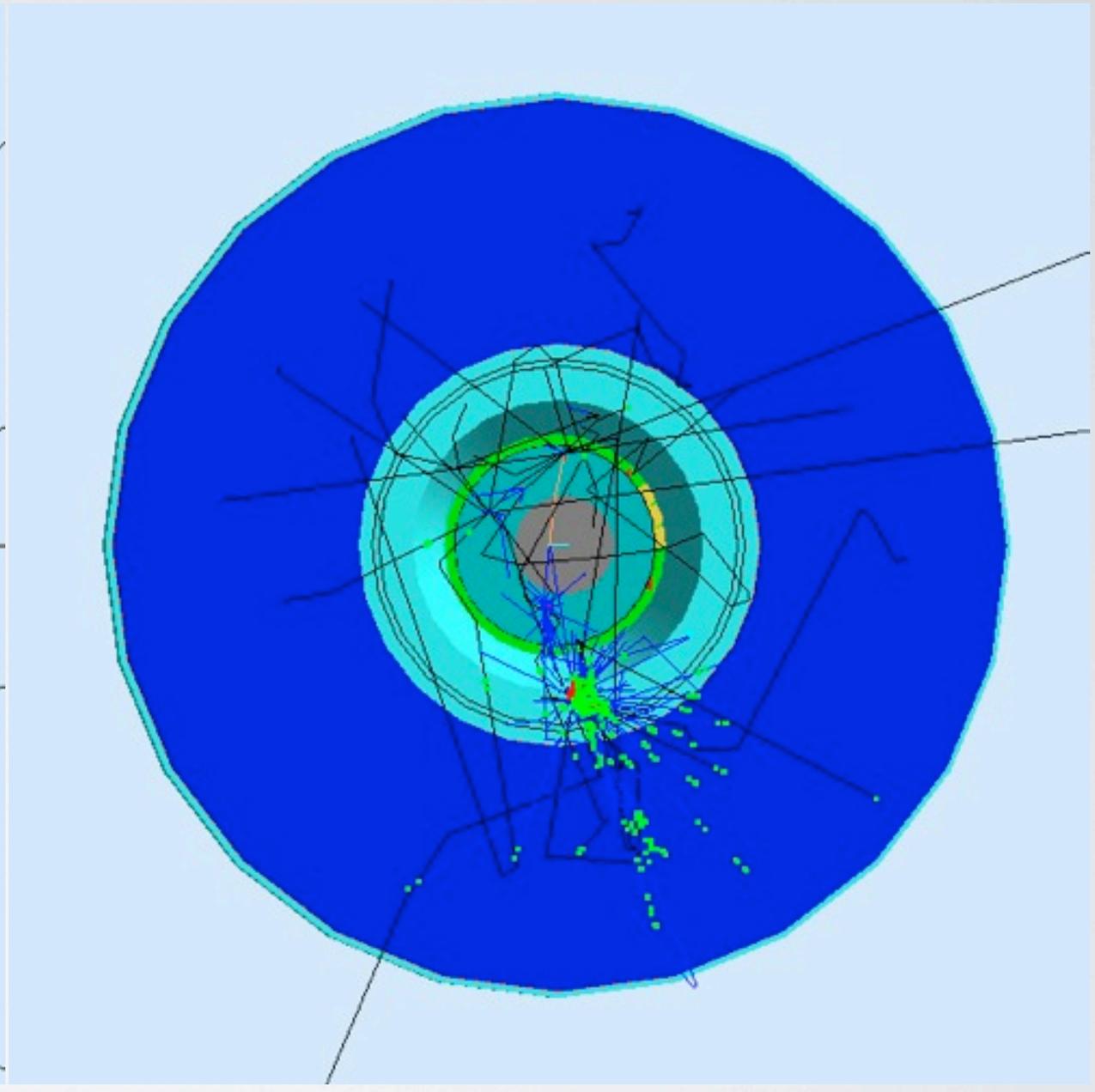


VISUAL INSPECTION

- 11 layer BaBar style baffles
- 500,000 e- on target
- Results in 44 events with photons crossing last GEM from vertices downstream of target
  - 1 looks like an internal Moller plus an external Moller (GEM4 multiplicity = 2)
  - 7 look like internal Mollers (GEM4 multiplicity = 1, 1, 1, 1, 1, 1, 3)
  - 20 look like external Mollers (mult = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1)
  - 16 are hadronics (mult = 1, 1, 2, 2, 3, 3, 3, 3, 4, 5, 5, 5, 5, 5, 9, 28)
- Total of 115 hits from 44 events (including 28 hits in 1 event).

Event with 28 photons crossing last GEM

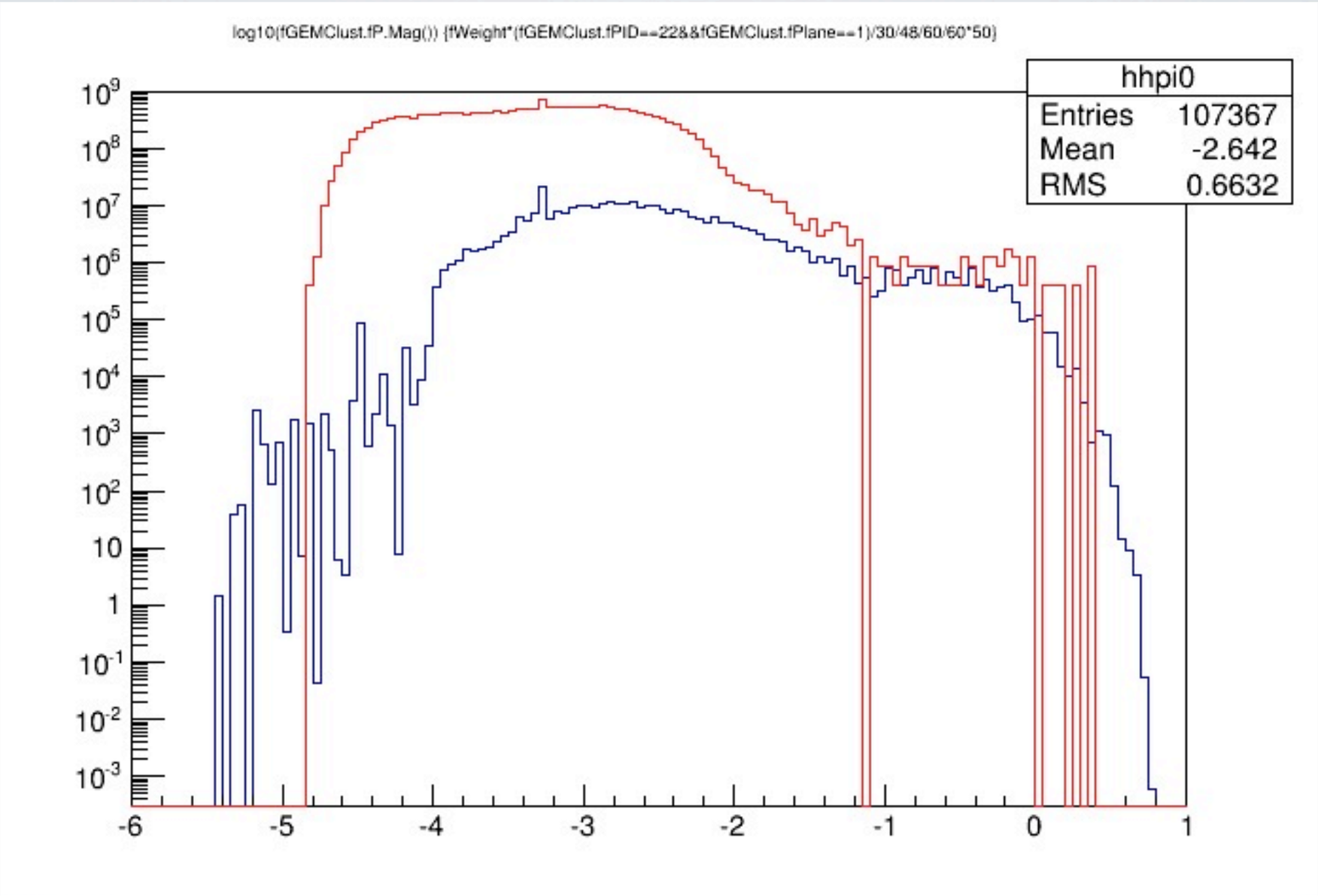




PHOTONS FROM π^0

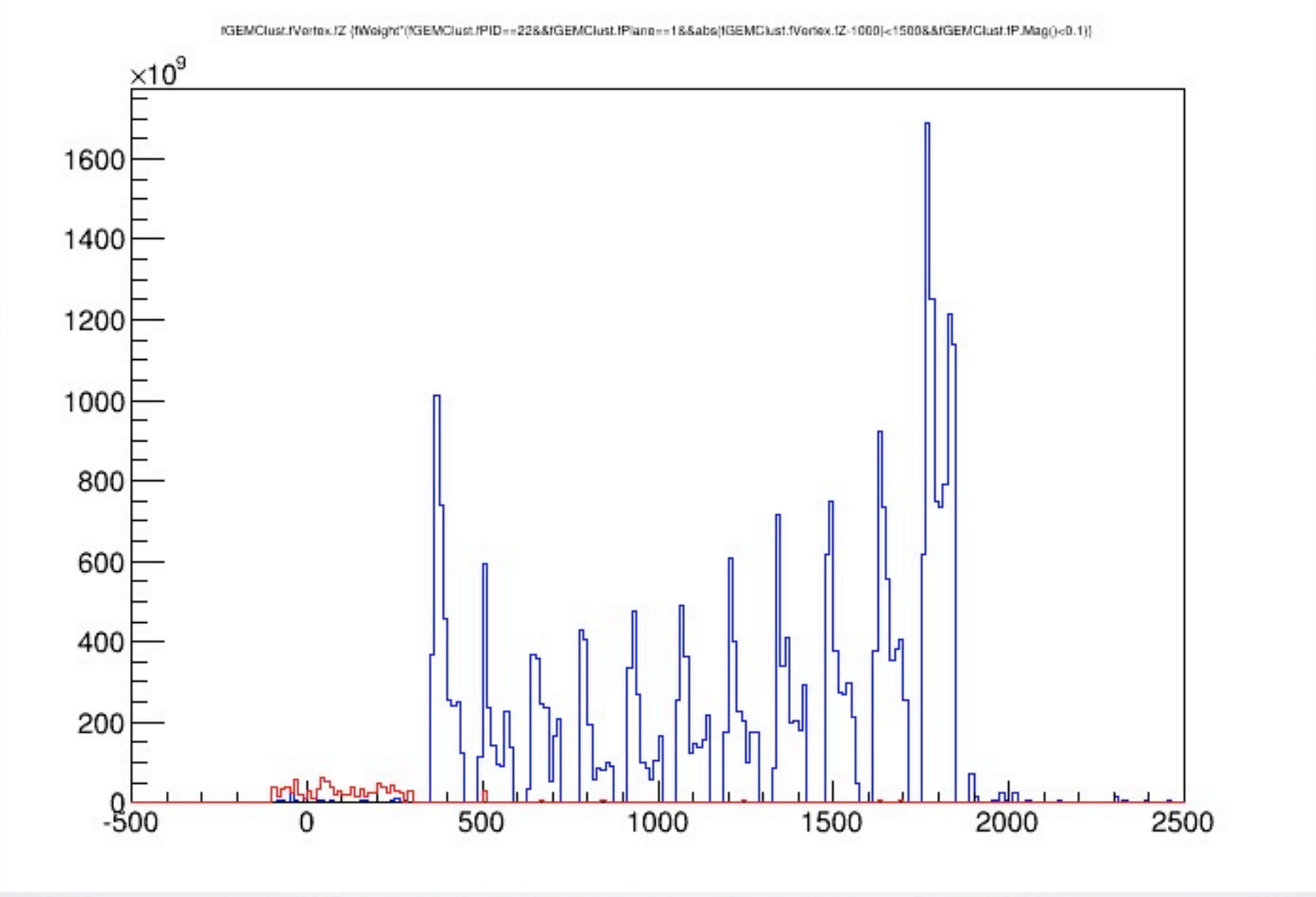
- π^0 generator (Wiser)
- 11 layer BaBar style baffles (lead)
- Photons crossing 2nd (of 4) GEMs (just before Cerenkov)

Photon rates (Hz/sector) at 50 μA vs log (p)



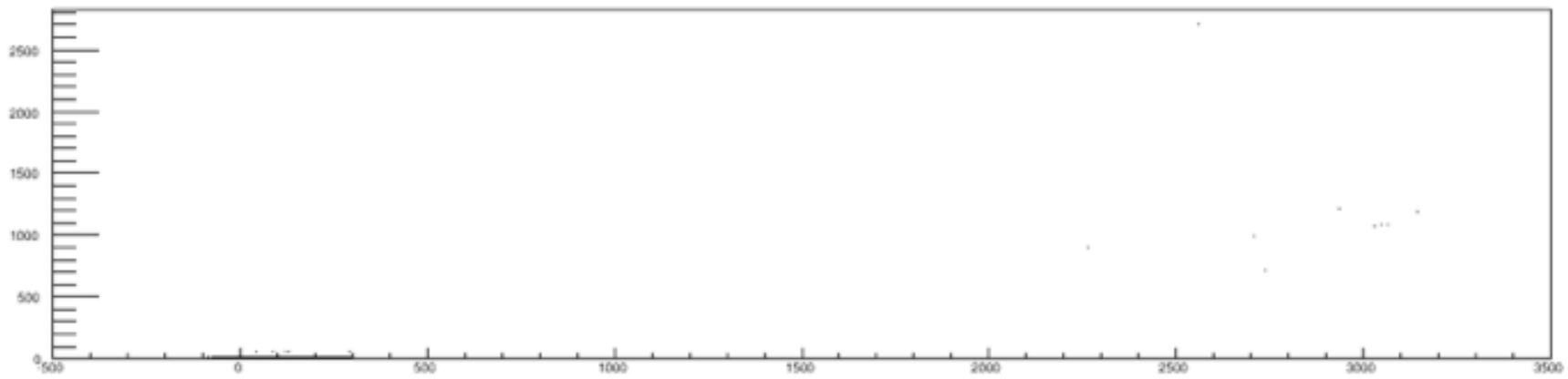
Red = EM photons, Blue = photons from **π**°

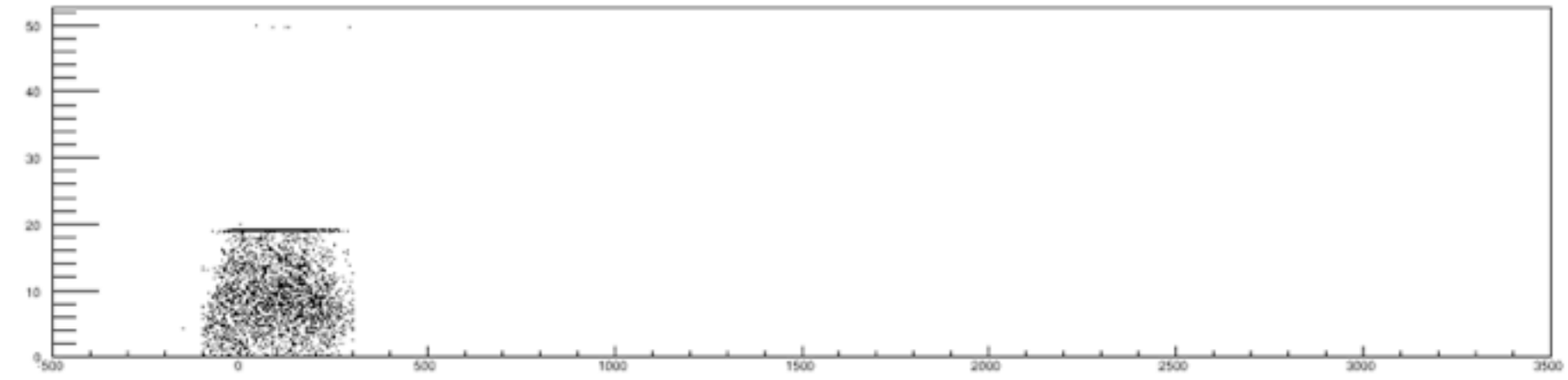
Photons below (above) 100 MeV come from vertices in baffles (target):

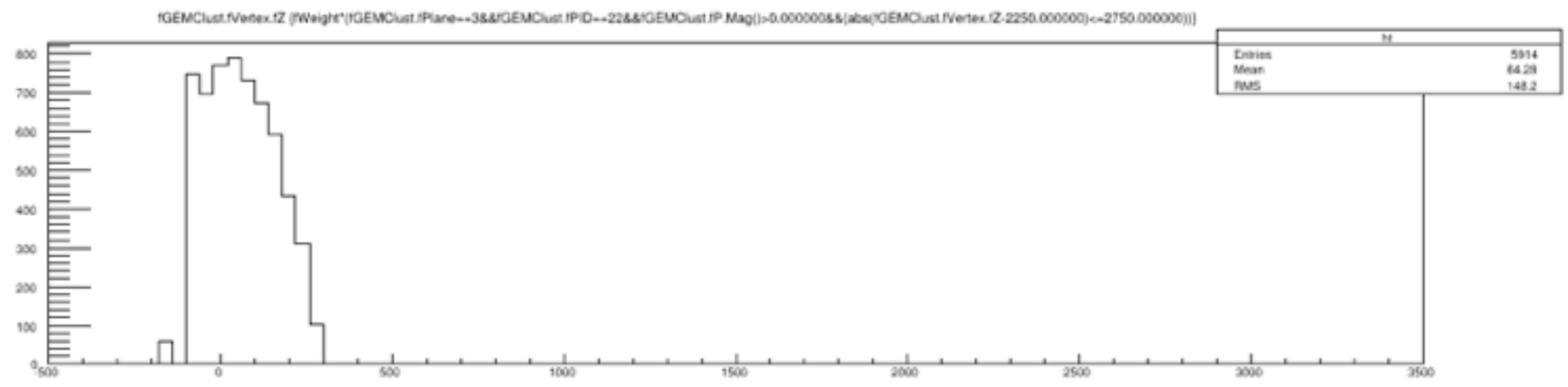


EXTRAS

Vertices for BG photons, GEM 4 Krypto BaBar 11

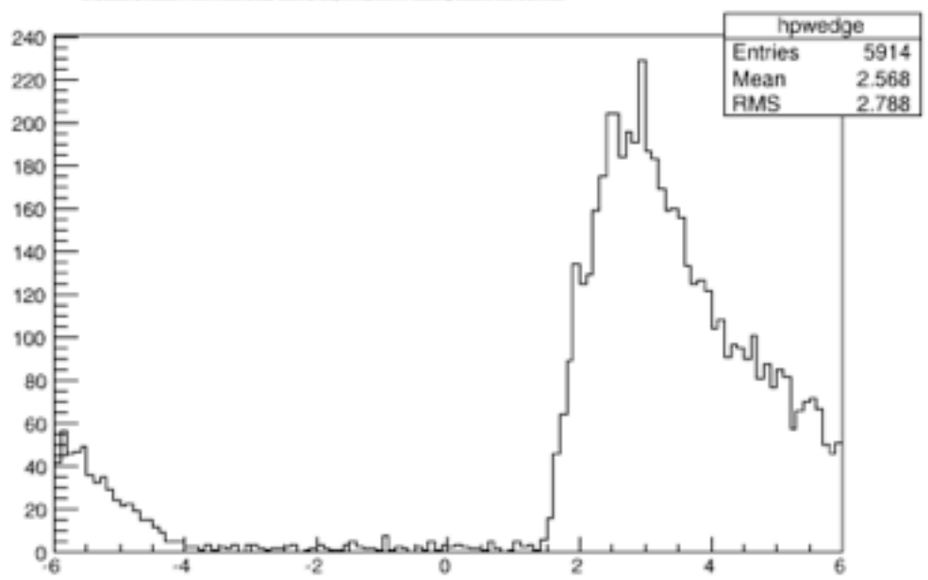




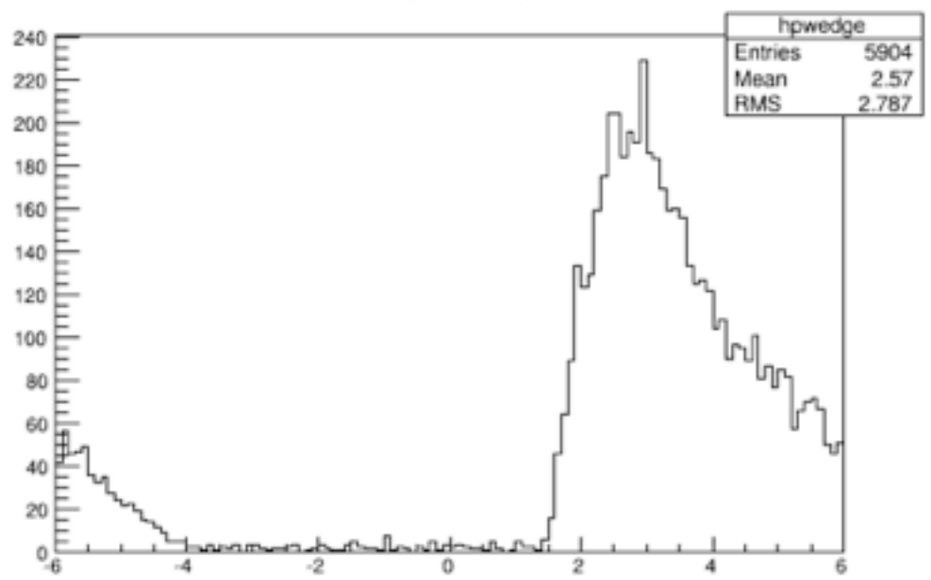


Hit phi for BG photons, GEM 4 Krypto BaBar 11

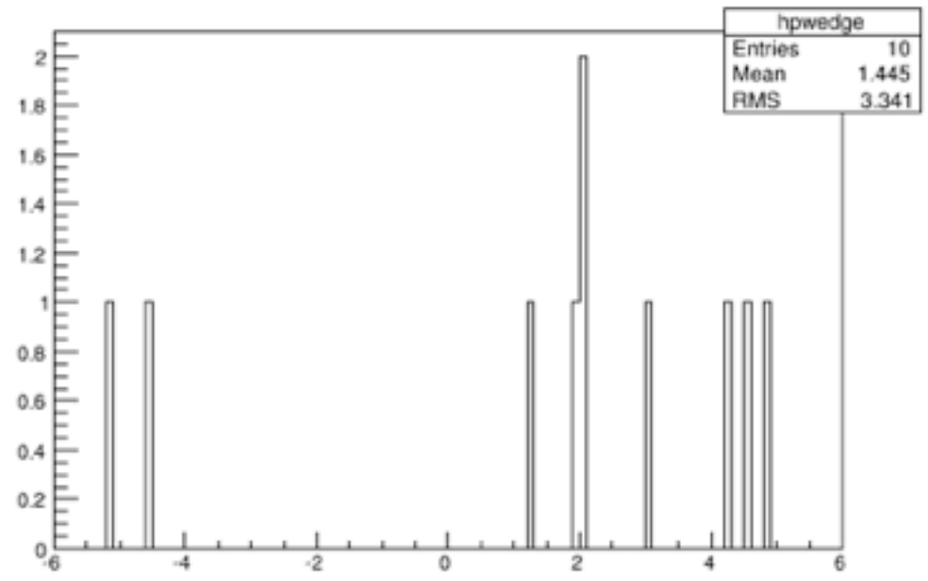
All vertices



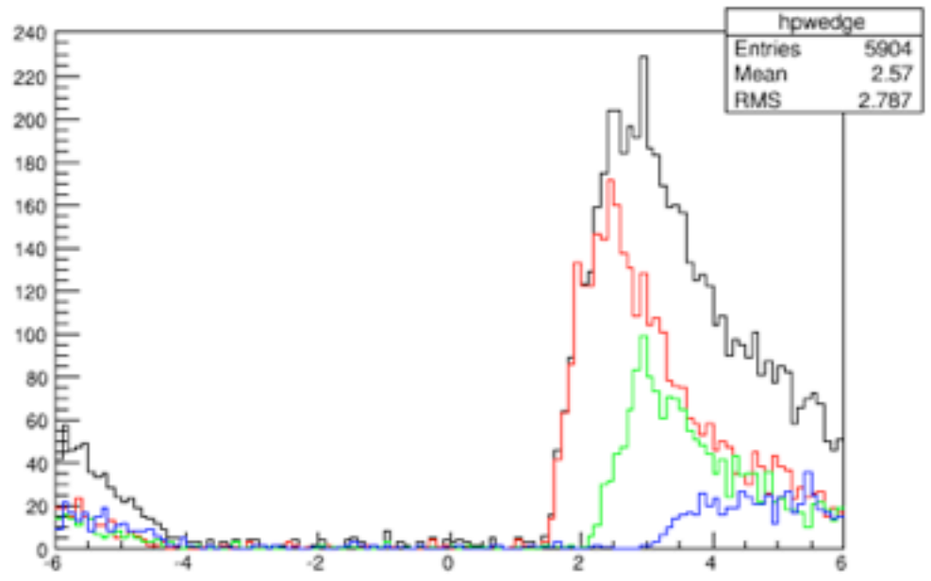
From target

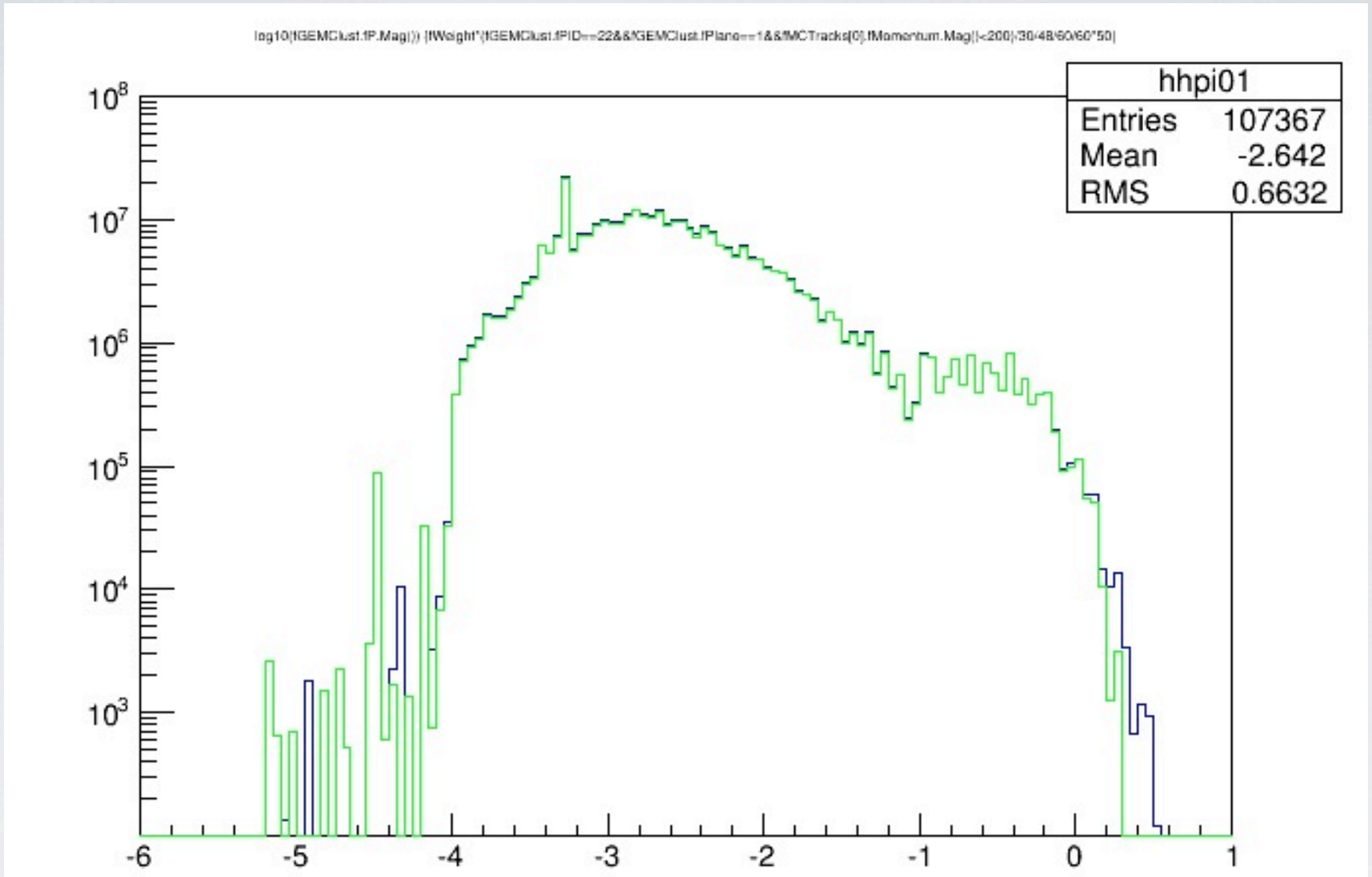


From downstream

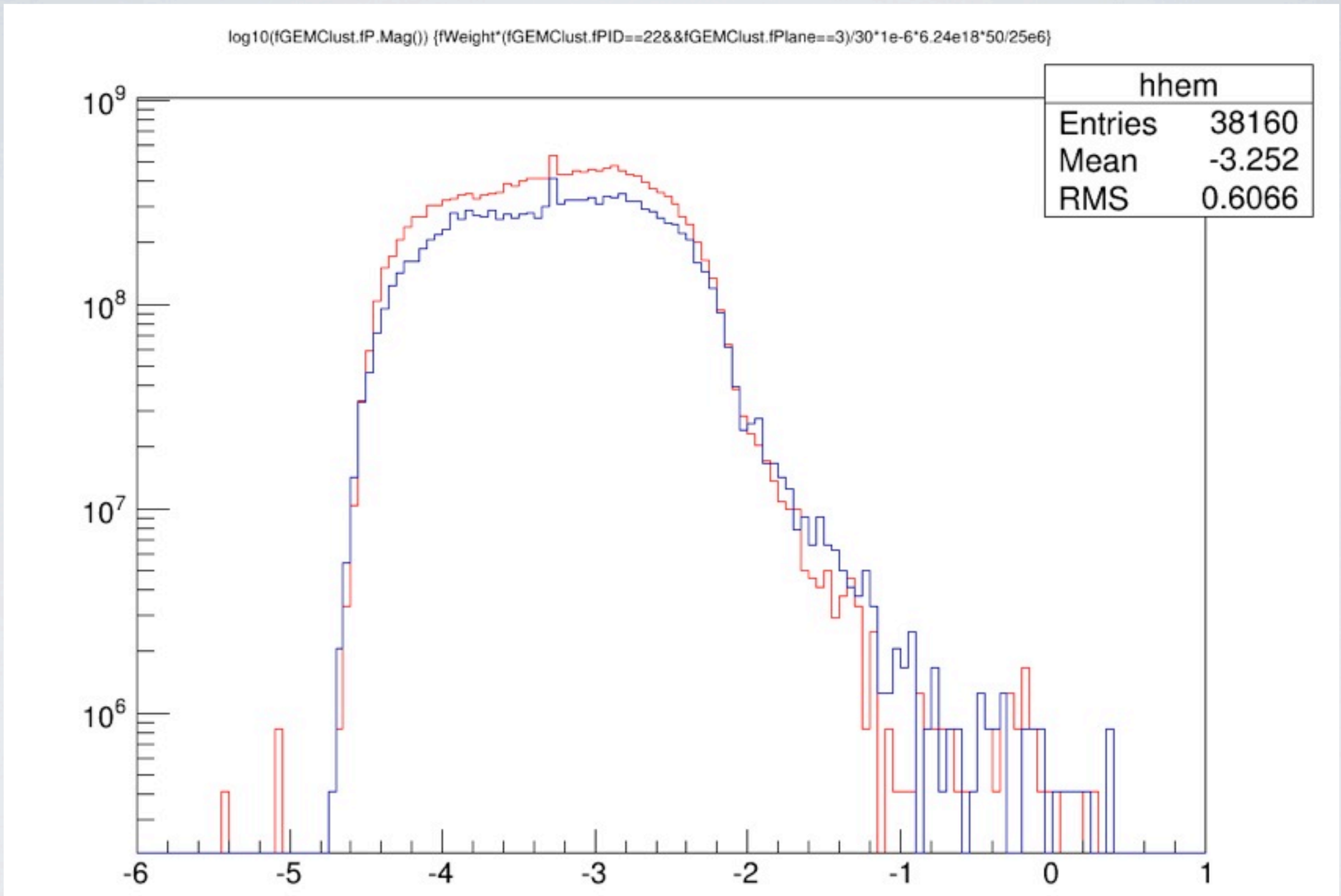


From target (radial cuts)





Blue = all pions, green = < 2 GeV



Red = 11 layer BaBar, Blue = 3.5°