Recap

- GuineaPig produces simulations of background pair production for different accelerator configurations. Some of the proposed accelerator configurations for the ILC are shown on the next slide:

ILC Machine Parameters

500 GeV Beam and IP Parameters

	TESLA	USSC	Nominal	Low Q	Large Y	Low P	High Lum
E_cms (GeV)	500	500	500	500	500	500	500
N	2.00E+10	2.00E+10	2.00E+10	1.00E+10	2.00E+10	2.00E+10	2.00E+10
Nb	2820	2820	2820	5640	2820	1330	2820
T_sep (ns)	336.9	336.9	307.7	153.8	307.7	461.5	307.7
Buckets @ 1.3 GHz	438	438	400	200	400	600	400
I_ave (A)	0.0095	0.0095	0.0104	0.0104	0.0104	0.0069	0.0104
Gradient	23.40	28.00	30.00	30.00	30.00	30.00	30.00
Geometric Luminosity	1.64E+38	1.45E+38	1.20E+38	1.29E+38	1.12E+38	1.24E+38	2.83E+38
Luminosity ($m^{-2}s^{-1}$)	2.94E+38	2.57E+38	2.03E+38	2.01E+38	2.00E+38	2.05E+38	4.92E+38
Coherent pairs/bc	7.14E-35	4.65E-34	7.71E-43	4.29E-31	3.19E-56	3.31E-15	2.21E-09
Inc. Pairs/bc	4.14E+05	3.66E+05	2.59E+05	8.37E+04	3.50E+05	6.12E+05	6.37E+05

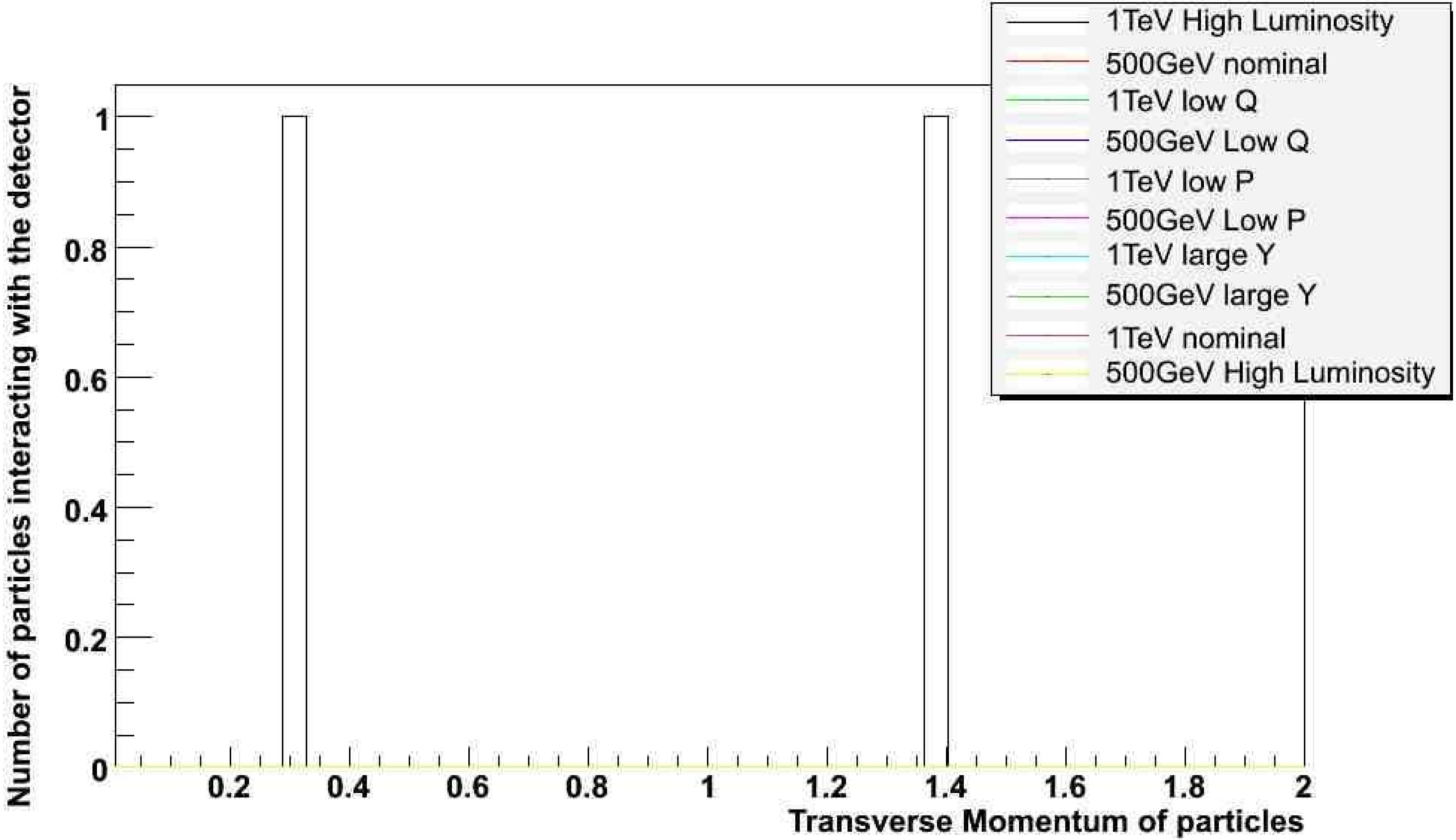
1 TeV Beam and IP Parameters

	TESLA	USCS	Nominal	Low Q	Large Y	Low P	High Lum
E_cms (GeV)	800	1000	1000	1000	1000	1000	1000
N	1.40E+10	2.00E+10	2.00E+10	1.00E+10	2.00E+10	2.00E+10	2.00E+10
Nb	4886	2820	2820	5640	2820	1330	2820
T_sep (ns)	175.4	336.9	307.7	153.8	307.7	461.5	307.7
Buckets @ 1.3 GHz	228	438	400	200	400	600	400
I_ave (A)	0.0128	0.0095	0.0104	0.0104	0.0104	0.0069	0.0104
Gradient	35.00	35.00	30.00	30.00	30.00	30.00	30.00
Geometric Luminosity	2.81E+38	2.27E+38	1.85E+38	1.85E+38	1.40E+38	1.81E+38	4.54E+38
Luminosity ($m^{-2}s^{-1}$)	5.07E+38	3.81E+38	2.82E+38	2.84E+38	2.81E+38	2.92E+38	7.88E+38
Coherent pairs/bc	3.15E-19	6.80E-11	1.92E-13	8.39E-08	2.03E-20	9.91E-01	8.18E+02
Inc. Pairs/bc	4.66E+05	5.01E+05	4.32E+05	1.50E+05	6.67E+05	1.10E+06	1.36E+06

Introduction

- Since the background particles all have relatively low transverse momentums their paths will spiral around the B-field lines in the detector.
- The transverse momentum of these particles determines how wide the spiral is, and therefore which parts of the detector they may pass through.
- The following graph shows how many particles (in a single bunch crossing) spiral widely enough to have a chance of interacting with the ECAL (ie the radius of the spiral is greater than 400mm).
- This is incoherent pair production only. Mini-jets to be studied later.

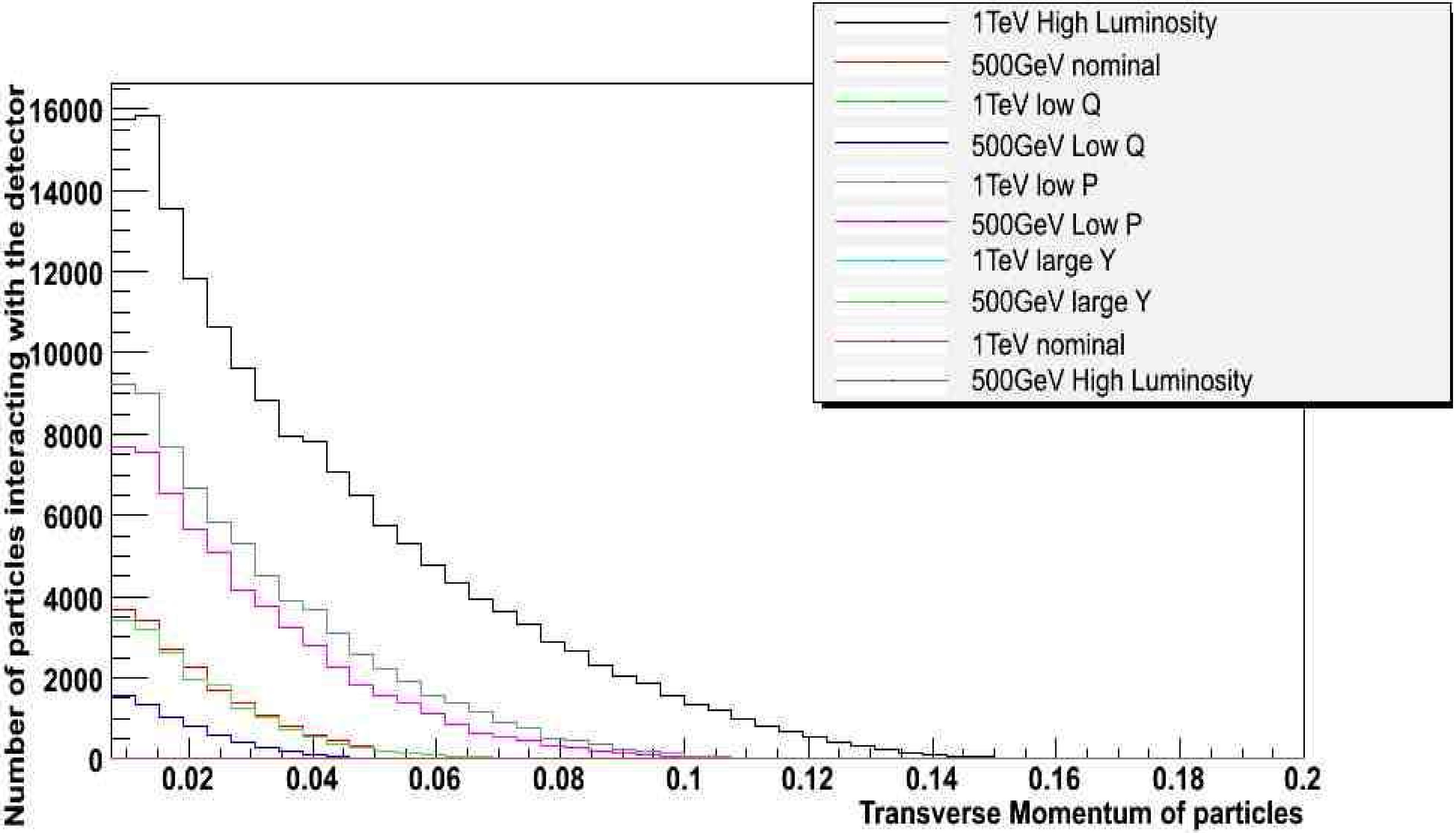
Number of particles heading directly for the ECAL per bunch crossing



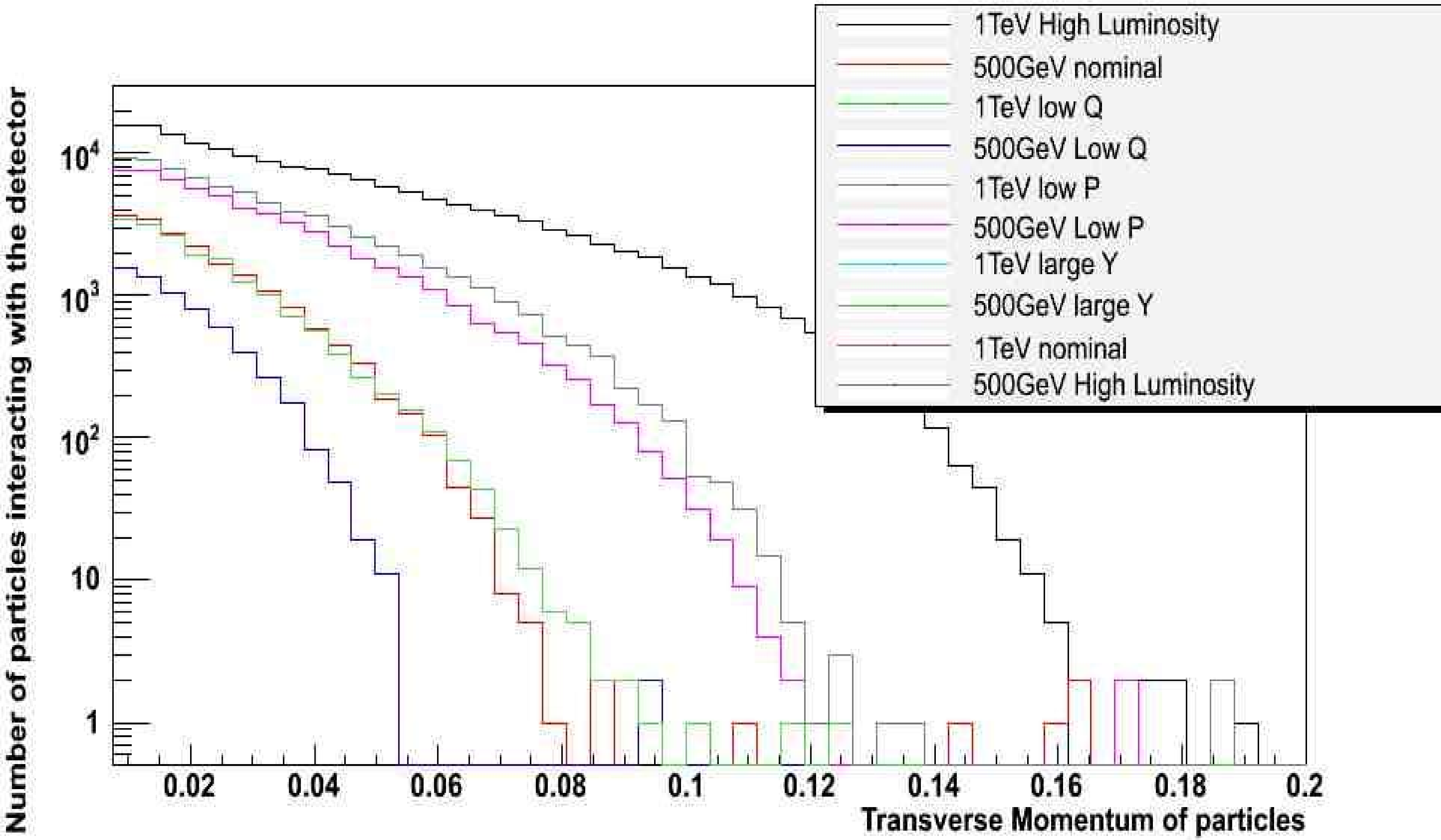
Redefinition

- Therefore background particles (and their resulting showers) interacting directly with the ECAL is not a major concern.
- However considerable numbers of background particles may interact with lower angle detectors.
- This could affect other parts of the detector via secondary particle production.
- The graphs on the next two pages show how many background particles interact with any part of the detector in a single bunch crossing (ie radius of spiral greater than 13mm).

Number of particles potentially interacting with the detector (per bunch crossing)



Number of particles interacting with the detector per bunch crossing (logarithmic scale)



Conclusion

- This data is currently running through a detector level simulation which should show the effect of a single bunch crossing on the whole detector.
- This should give some idea of what damage (if any) the detector may sustain from background particles, and should also show how many background counts different parts of the detector will have to deal with.