



Update inputs for performance studies



Giuliana Rizzo
Universita' & INFN Pisa



Background Update

x5 safety included, correction of area not yet included

Layers	lato	readout pitch	Strip rate kHz	Ratio pairs / total	Ratio rad bhabha / total	Ratio touscheck LER/ total	Ratio touscheck HER/ total
0	1	50	1.21E+03	0.90	0.03	0.06	0.02
0	2	50	1.21E+03	0.82	0.04	0.11	0.04
1	phi	50	7.24E+02	0.58	0.04	0.30	0.07
1	z	100	4.73E+02	0.39	0.04	0.45	0.12
2	phi	55	5.25E+02	0.48	0.05	0.38	0.08
2	z	100	4.54E+02	0.31	0.05	0.52	0.12
3	phi	100	4.19E+02	0.33	0.11	0.47	0.08
3	z	110	2.70E+02	0.23	0.10	0.56	0.11
4	phi	100	9.00E+01	0.35	0.23	0.34	0.08
4	z	210	4.70E+01	0.36	0.20	0.35	0.09
5	phi	100	5.44E+01	0.39	0.21	0.32	0.08
5	z	210	3.08E+01	0.37	0.19	0.35	0.09

- Present status of background rates shown in the table.
- Beam gas, almost ready, need to be included: first tests indicate beam gas~touscheck
- Need to supply a similar table for the track rate and cluster rate that will be used for fastsim performance studies (in preparation)

- Rates/area in this table estimated with the cylindrical approximation and need to be rescaled to take into account the correct silicon area.
- Correction factors calculated from Bruno results on strip rates in local coordinates → ~ 30%-15% reduction in Layer0-1-2-3, ~ok in Layer4-5

Hit Efficiency

- Need to rerun efficiency study (PV_M1) using new total rates (rescaled by correct area and including beam gas) nominal and x5.

renormalization due to correction of area
0.687
0.690
0.853
0.904
0.870
0.894
0.890
0.880
0.980
0.992
1.059
0.992

Nominal time window cut

- From the study on hit time resolution (PV) take the nominal time window cut
- Results from MI simulation on L5 (1 us shaping and 4 bit TOT) indicate 50 ns resolution on time instead of 84 ns obtained by PV with the same conditions.
- Need to understand this discrepancy before accepting the smallest value.
- Possible reduction in layer5 are also possible (25 ns on time walk resolution with 6 TOT bit) according to MI simulation
- Keep the conservative estimate now!

Layer	t_p [ns]	$t_p / T_{CK,TOT}$	$f_{CK,TS}$ [MHz]	σ_{walk} [ns]	σ_{t0} [ns]
0	25	3	30	2.1	9.8
1	100	3	30	8.3	12.7
2	100	3	30	8.3	12.7
3	200	3	30	16.7	19.2
4	500	3	30	41.7	42.8
5	1000	3	30	83.3	83.9

Offline time window (5x hit time resolution from simulation) ns

50
75
75
100
250
450