



New SVT Background rates

Summary of results from latest back production
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SVT background from Dec 2011 production

- Results presented by R. Cenci in Frascati in Dec. 2011
 - independent check performed by C. Stella in TS confirmed these numbers

Pairs: rates increase w.r.t. May 2011 production

- in L0-1-2 +40-20%
- x2.5-x4 in L3-4-5!!!!

Rad. Bhabha: rates are not small w.r.t to pairs (use May 2011 pairs as reference)

- L0-1-2-3 rates are 5-10-20-50% of pairs rates
- L4-5 rates are high as pairs!

Touschek: rates are not small w.r.t pairs (except in L0) from 1 to 3 times higher than pairs in L1-5 (use May 2011 pairs as reference)

New back rates are not acceptable for the whole SVT (not only L0)!

SVT Background - Dec 2011

Layers	lato	readout pitch	pairs - strip rate May 2011 Cenci MHz/cm2	pairs- strip rate May 2011 TS MHz/cm2	pairs - strip rate Dec 2011 Cenci MHz/cm2	rad bhabha - strip rate Dec 2011 Cenci MHz/cm2	Tousc HER - strip rate Dec 2011 Cenci MHz/cm2	Tousc LER - strip rate Dec 2011 Cenci MHz/cm2	Total - strip rate Dec 2011 Cenci MHz/cm2	Ratio total strip rate Dec 2011/pairs rate May	Ratio pairs rate Dec/pairs rate May	Ratio rad bhabha / pairs May	Ratio tousch / pair May	Ratio pairs / total
0	1	50	23.3	24.3	32.2	0.96	0.52	1.73	35.41	1.52	1.38	0.04	0.10	0.91
0	2	50	29.9	24.3	40.6	1.6	1.45	4.37	48.02	1.61	1.36	0.05	0.19	0.85
1	phi	50	1.5	1.61	1.7	0.12	0.18	0.74	2.74	1.83	1.13	0.08	0.61	0.62
1	z	100	0.7	0.93	0.85	0.083	0.19	0.77	1.893	2.70	1.21	0.12	1.37	0.45
2	phi	55	0.72	0.73	0.88	0.086	0.12	0.56	1.646	2.29	1.22	0.12	0.94	0.53
2	z	100	0.35	0.4	0.45	0.064	0.14	0.61	1.264	3.61	1.29	0.18	2.14	0.36
3	phi	100	0.19	0.19	0.44	0.084	0.055	0.31	0.889	4.68	2.32	0.44	1.92	0.49
3	z	100	0.097	0.12	0.27	0.056	0.055	0.29	0.671	6.92	2.78	0.58	3.56	0.40
4	phi	100	0.012	0.007	0.05	0.014	0.004	0.019	0.087	7.25	4.17	1.17	1.92	0.57
4	z	210	0.0076	0.0036	0.03	0.008	0.003	0.013	0.054	7.11	3.95	1.05	2.11	0.56
5	phi	100	0.006	0.005	0.019	0.006	0.002	0.009	0.036	6.00	3.17	1.00	1.83	0.53
5	z	210	0.0041	0.0024	0.014	0.004	0.0016	0.007	0.0266	6.49	3.41	0.98	2.10	0.53

Layers	lato	strip length (r-phi as BaBar, z as in design Bosi Dec 2001 cm)	Area strip SuperB cm2	Area strip SuperB old cm2	average ganging	Strip rate KHz including x 5 safety	Strip rate KHz including ganging z and x 5 safety	shaping time analog ns	max dead time due to analog 2.4 * tau ns	N hit in dead time analog	Efficiency (1/(1+N))	N hit in dead time analog including ganging	Efficiency (1/(1+N) including ganging)	Offline time window ns	Online time window ns	offline occupancy	online occupancy
0	1	1.77	8.84E-03	8.84E-03	1	3.13E+02	1.56E+03	25	60	9.39E-02	0.91	9.39E-02	0.91	60	300	0.094	0.469
0	2	1.77	8.84E-03	8.84E-03	1	4.24E+02	2.12E+03	25	60	1.27E-01	0.89	1.27E-01	0.89	60	300	0.127	0.637
1	phi	11.10	5.55E-02	5.37E-02	1	1.47E+02	7.35E+02	100	240	1.76E-01	0.85	1.76E-01	0.85	100	300	0.074	0.221
1	z	3.99	3.99E-02	4.00E-02	1.3	7.57E+01	3.79E+02	100	240	9.09E-02	0.92	1.18E-01	0.89	100	300	0.049	0.148
2	phi	13.22	7.27E-02	6.50E-02	1	1.07E+02	5.35E+02	100	240	1.28E-01	0.89	1.28E-01	0.89	100	300	0.053	0.160
2	z	4.80	4.80E-02	4.80E-02	1.3	6.07E+01	3.03E+02	100	240	7.28E-02	0.93	9.46E-02	0.91	100	300	0.039	0.118
3	phi	19.22	1.92E-01	1.91E-01	1	1.70E+02	8.51E+02	200	480	4.08E-01	0.71	4.08E-01	0.71	150	300	0.128	0.255
3	z	7.01	7.01E-02	7.00E-02	1.3	4.70E+01	2.35E+02	200	480	1.13E-01	0.90	1.47E-01	0.87	150	300	0.046	0.092
4	phi	29.92	2.99E-01	2.92E-01	1	2.54E+01	1.27E+02	500	1200	1.52E-01	0.87	1.52E-01	0.87	400	1000	0.051	0.127
4	z	5.14	1.08E-01	1.04E-01	2.3	5.62E+00	2.81E+01	500	1200	3.37E-02	0.97	7.75E-02	0.93	400	1000	0.026	0.065
5	phi	38.06	3.81E-01	3.75E-01	1	1.35E+01	6.75E+01	1000	2400	1.62E-01	0.86	1.62E-01	0.86	800	1000	0.054	0.068
5	z	5.14	1.08E-01	1.04E-01	2.3	2.77E+00	1.38E+01	1000	2400	3.32E-02	0.97	7.64E-02	0.93	800	1000	0.025	0.032

SVT background from Dec 2011 production

New back rates are not acceptable for the whole SVT (not only L0):

- With new numbers offline occupancy (to be used in reconstruction) is too high for L1-5: 7-5-12-5-5% in r-phi and 5-5-5-2.5-2.5% in z.
 - In BaBar the average offline occupancy in 2003 was ~0.7-0.6-0.4% in L1-2-3 ~ 0.1% L4-5
 - Tests performed in 2003 for the high lumi running of BaBar, performed with BaBar x5 background occupancy (~3-4% in L1-2-3 and <1% in L4-5), indicate BaBar reco code start to have problems with this level of background.
 - My guess is that in SuperB reco code cannot handle an offline occupancy 10 times higher (L1-2-3) and 25-50 times higher (L4-5) than what we had in BaBar.
 - What should be a reasonable limit for offline occupancy is not easy to evaluate. Asked reco experts.
 - Dave Brown answer: ~5% occu. is MAYBE still ok, 10% not acceptable!
 - Still need to check if 5% is the right limit.
 - Note: Online occupancy in BaBar is x5 w.r.t offline occu. In SuperB online occupancy is x1.5-x5 w.r.t offline (time window varies with layers)
- Efficiency due to analog dead time < 90% in all layers (r-phi)!

Differences in Bruno: Dec vs May production

1. B field (1.5 T) active only in +/-20cm in Dec production

- In May production B field was ON everywhere inside the beam line for pairs and OFF for Rad Bhabha production.
- New pairs production in Jan with B field extended in +/-40 cm. Strip rate back down by a factor 2 in Layers 3-4-5. Still a factor ~ 2 higher than in May. Layer 0-1-2 still as in dec (+40%-20% w.r.t May).
- See table in next pages (checks by Cenci and Stella)

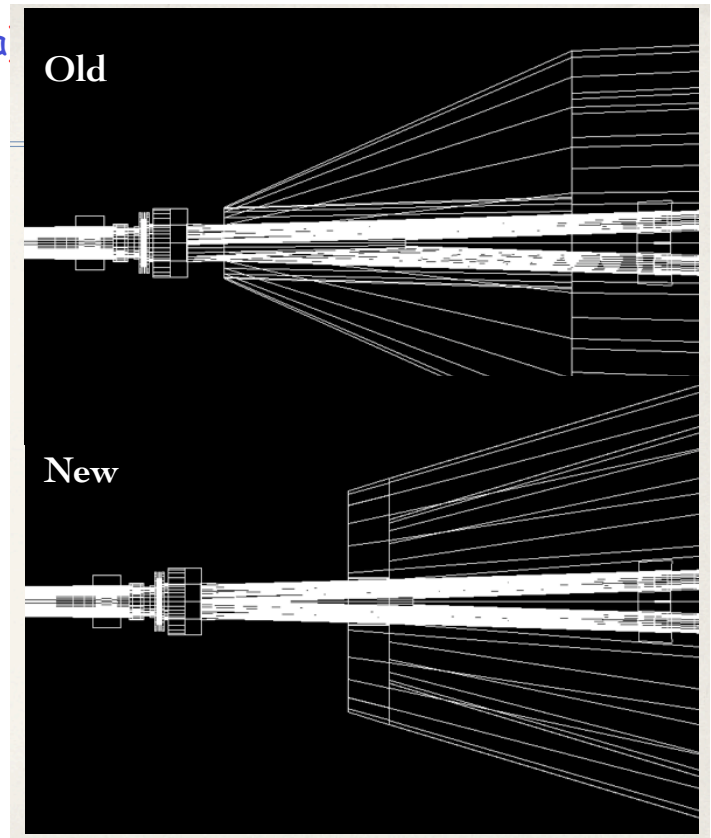
2. Shields shape different

consistent with new IR design



3. Material of criostats now inserted

- New plot of origin point for tracks that hit SVT are now produced (Cenci, Stella) to understand better the origin of SVT background.



Pairs with extended B field

LAYERS	May2011 [MHz/cm ²] 2photons	Dec 2011 [MHz/cm ²] 2photons	Dec 2011 2photons Ext. B field
L0 phi	23.3	32.2	32.4
L0 z	29.9	40.6	40.8
L1 phi	1.5	1.7	1.74
L1 z	0.7	0.85	0.82
L2 phi	0.72	0.88	0.84
L2 z	0.35	0.45	0.42
L3 phi	0.194	0.44	0.26
L3 z	0.097	0.27	0.14
L4 phi	0.012	0.05	0.021
L4 z	0.0076	0.03	0.014
L5 phi	0.006	0.019	0.011
L5 z	0.0041	0.014	0.0076

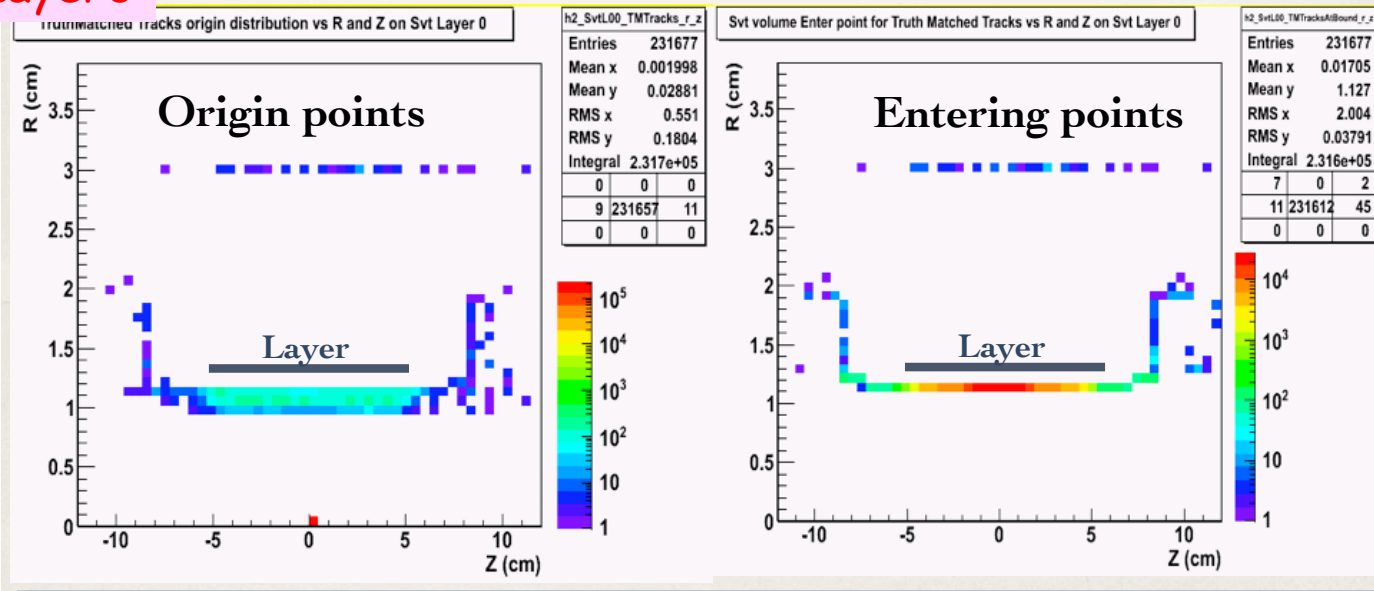
Riccardo and Carlo see a similar reduction in Layer3-4-5 w.r.t Dec prod. with reduced B field extension

Layer	Pitch ϕ (-45) μm	2011 May Strip ϕ (-45) Rate (Mhz/cm ²)	2011 Dec Strip ϕ (-45) Rate (Mhz/cm ²)	2012 Jan Strip ϕ (-45) Rate (Mhz/cm ²)	Pitch Z (+45) μm	2011 May Strip Z (+45) Rate (Mhz/cm ²)	2011 Dec Strip Z (+45) Rate (Mhz/cm ²)	2012 Jan Strip Z (+45) Rate (Mhz/cm ²)
0	50	25.71	29.92	30.25	50	25.71	29.92	30.18
1	50	1.61	1.90	1.88	100	0.93	1.08	1.06
2	55	0.73	0.87	0.86	100	0.40	0.53	0.48
3	55	0.19	0.49	0.26	100	0.12	0.41	0.16
4	100	0.0070	0.0214	0.0124	210	0.0036	0.0167	0.0070
5	100	0.0047	0.0111	0.0081	210	0.0024	0.0067	0.0050

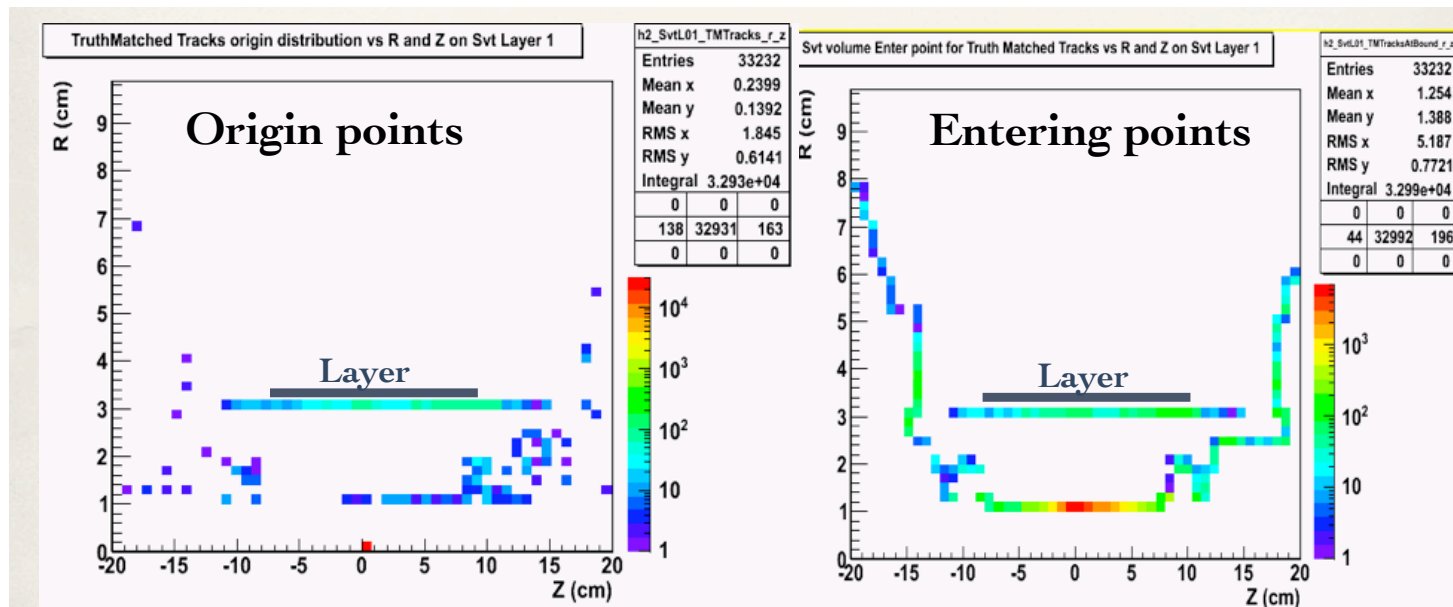
New Control Plots

- More plots shown at the SVt-Bak meeting yesterday:
- <http://agenda.infn.it/conferenceDisplay.py?confId=4569>

Layer0



Layer1



SVT Background - Jan 2011

Layers	lato	pairs-strip rate Dec 2011 B filed +/- 20 cm MHz/cm2	pairs - strip rate Jan 2011 Cenci B field +/- 40 cm MHz/cm2	Total - strip rate Jan 2011 Cenci MHz/cm2	Ratio total strip rate Dec 2011/pair s rate May	Ratio pairs rate Jan/pairs rate May	Ratio rad bhabha / pairs May	Ratio tousch / pair May	average ganging (worst case ganging N strips/N readout chans)	Strip rate KHz including ganging z and x 5 safety	Efficiency (1/(1+N)) including ganging	Offline time window ns	Online time window ns	offline occupa ncy	online occupa ncy	pairs offline occupanc y
0	1	32.2	32.4	35.61	1.53	1.39	0.04	0.10	1.00	1.57E+03	0.91	60	300	0.094	0.472	0.086
0	2	40.6	40.8	48.22	1.61	1.36	0.05	0.19	1.00	2.13E+03	0.89	60	300	0.128	0.639	0.108
1	phi	1.7	1.74	2.78	1.85	1.16	0.08	0.61	1.00	7.46E+02	0.85	100	300	0.075	0.224	0.047
1	z	0.85	0.82	1.863	2.66	1.17	0.12	1.37	1.23	4.59E+02	0.90	100	300	0.046	0.138	0.020
2	phi	0.88	0.84	1.606	2.23	1.17	0.12	0.94	1.00	5.22E+02	0.89	100	300	0.052	0.157	0.027
2	z	0.45	0.42	1.234	3.53	1.20	0.18	2.14	1.45	4.30E+02	0.91	100	300	0.043	0.129	0.015
3	phi	0.44	0.26	0.709	3.73	1.37	0.44	1.92	1.00	6.78E+02	0.75	150	300	0.102	0.204	0.037
3	z	0.27	0.14	0.541	5.58	1.44	0.58	3.56	1.35	2.56E+02	0.89	150	300	0.038	0.077	0.010
4	phi	0.05	0.021	0.058	4.83	1.75	1.17	1.92	1.00	8.47E+01	0.91	400	1000	0.034	0.085	0.012
4	z	0.03	0.014	0.038	5.00	1.84	1.05	2.11	2.26	4.47E+01	0.95	400	1000	0.018	0.045	0.007
5	phi	0.019	0.011	0.028	4.67	1.83	1.00	1.83	1.00	5.25E+01	0.89	800	1000	0.042	0.053	0.017
5	z	0.014	0.0076	0.0202	4.93	1.85	0.98	2.10	2.84	2.98E+01	0.93	800	1000	0.024	0.030	0.009

- Need to reduce rates to stay in the range 3-5% offline occupancy
 - understand better what is the acceptable occupancy limit between 3-5%
 - Layer0 rates estimated in Bruno should be reduced by 30% smaller radius w.r.t actual stripsets design)

Next steps:

- Pairs: try to understand from origin points if there are margins of reduction (shields shape?)
- Touschek: M. Boscolo will try to change collimators settings to reduce the Touschek losses.
- Touschek and Rad Bhabha production with extended field (no changes in L0-1-2 expected, could help in L3-4-5)