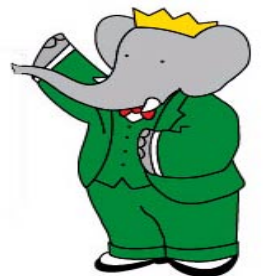# $B \rightarrow K_S\pi^0(\gamma)$ & SVT outer radius: updated study

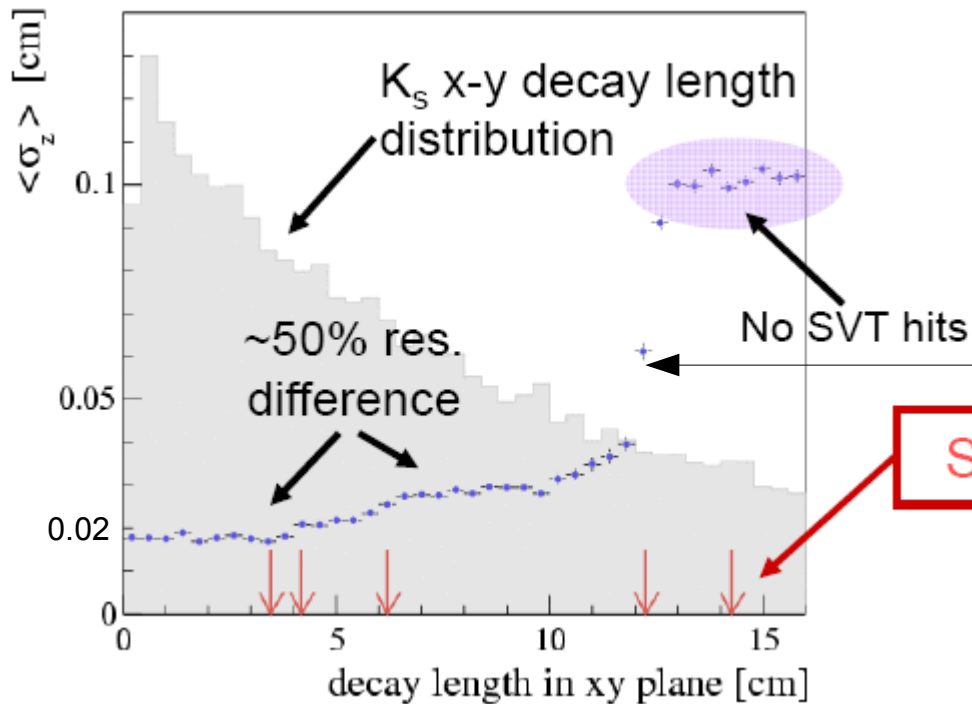## Gabriele Simi
(University of Maryland)

Outline

- New SVT configuration: L0 and acceptance

- Estimate the error on S

  - Δz resolutions for baseline as similar as BaBar but dt resolution is worse

 - Expanded SVT: fraction of usable KS for time dependent study increases

Resoution vs f.t. In BaBar

K_s x-y decay length distribution

~50% res. difference

No SVT hits

Resolution depends on number of SVT layers traversed by pions from K_s …

SVT layers

Pattern Recognition: Tracks with only one SVT hit where not found in BaBar

- Better resolution close to the IP because of layer0

KS d.l. xy
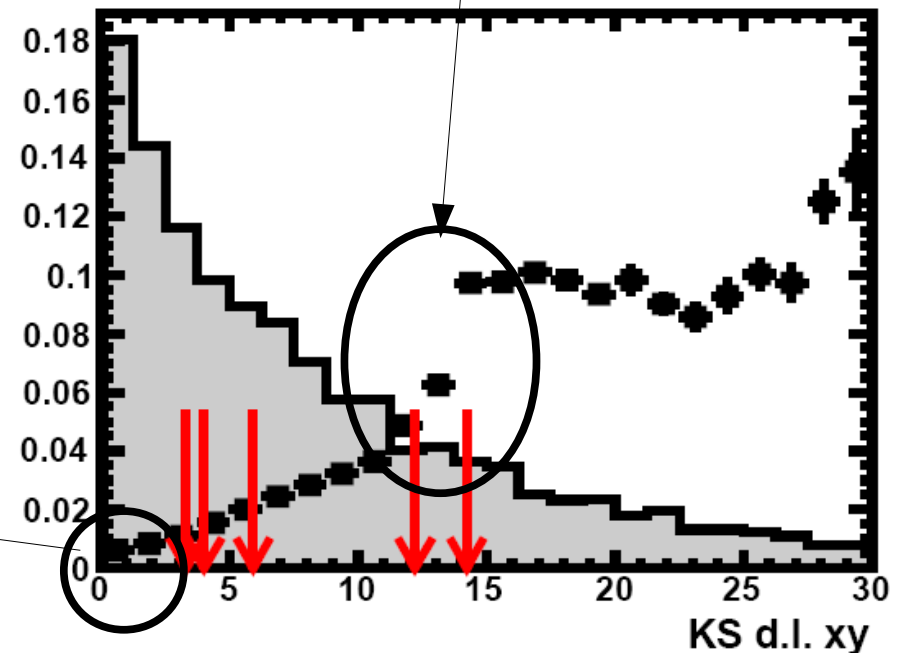
Baseline and expanded configurations

- Baseline SVT configuration as implemented by Nicola

  - L0 is now the hybrid pixel solution

  - Angular coverage increased down to 300mrad

  - Geometric acceptance goes from 89% to 95%

- Expanded configuration: L45 and L3 [N.Neri]

  - Layer 3: 5.9-> 9.4

  - Layer 4: 12.2->20.6

  - Layer 5: 14.2->22.6 (DCH S.T. is at 23.6cm)
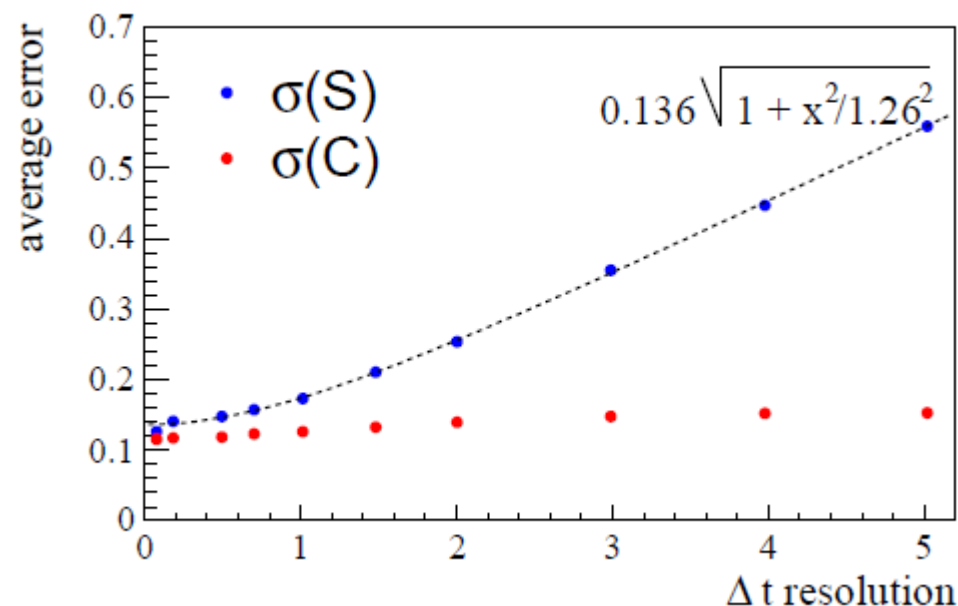
Filling the gap between SVT and DCH
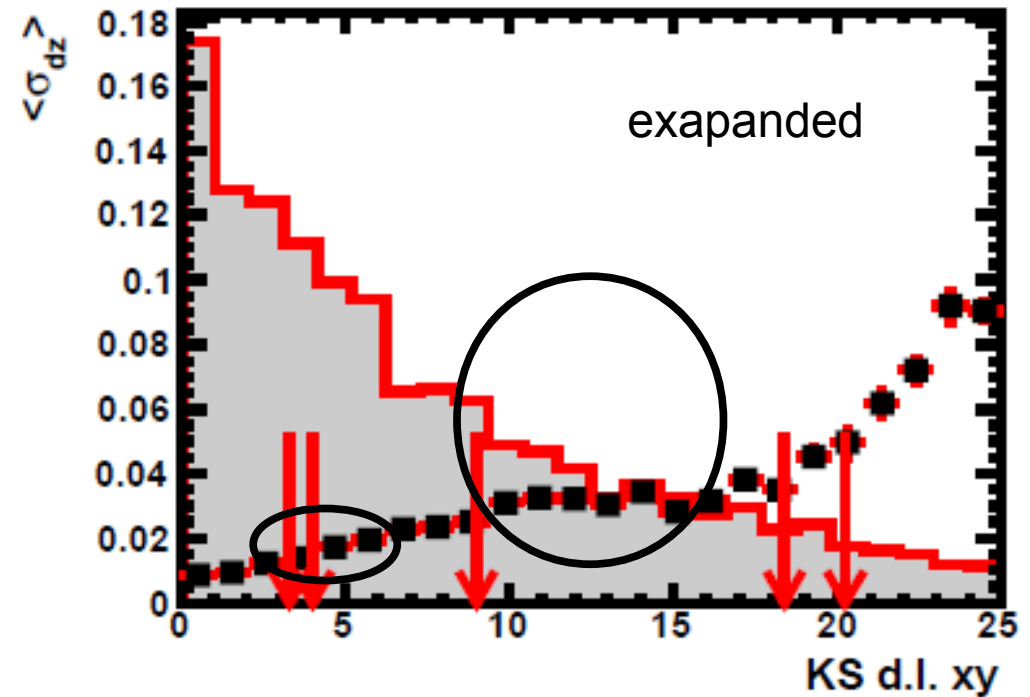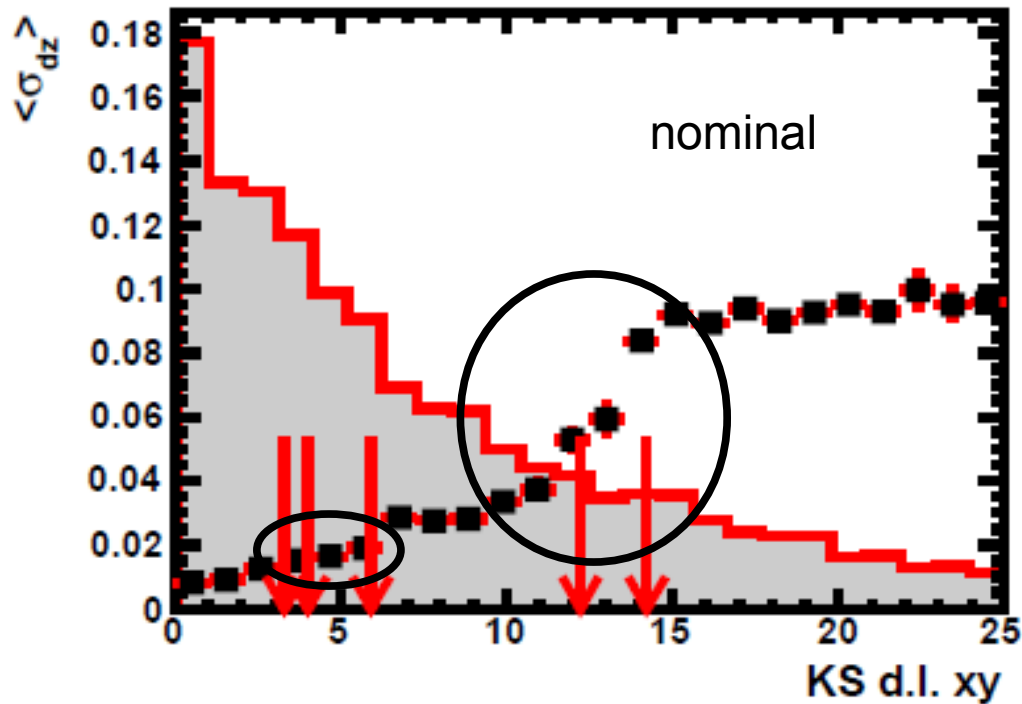
Events used in Δt fit for S

	Nominal	expanded
• Class I & II: used for dt fit	72%	88%
• [was	63%	73%]
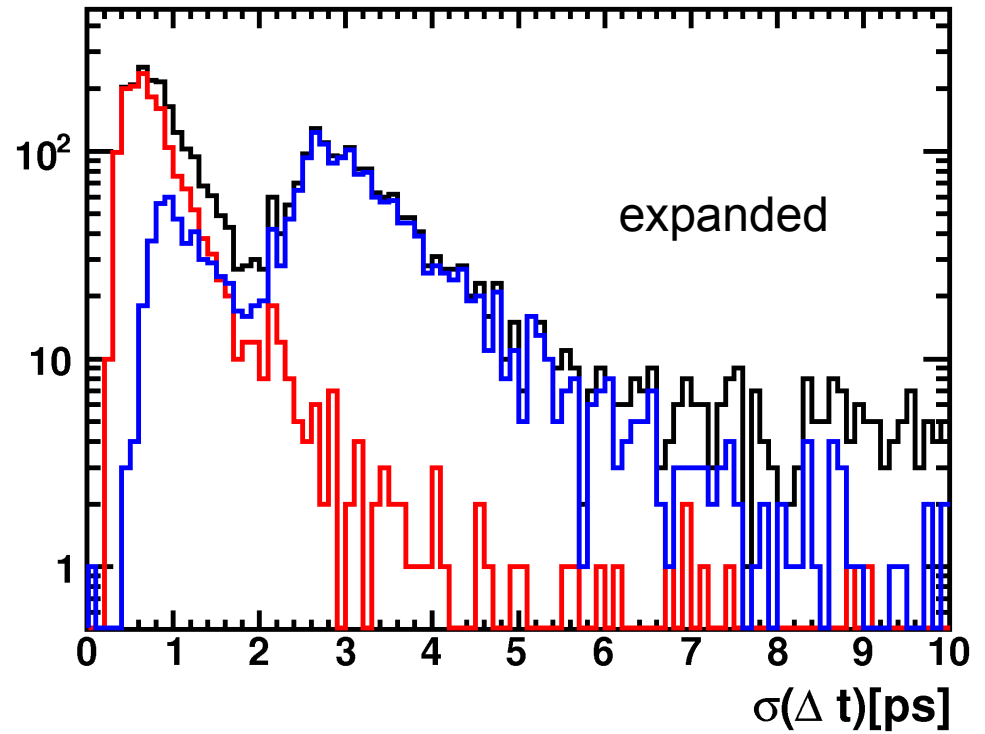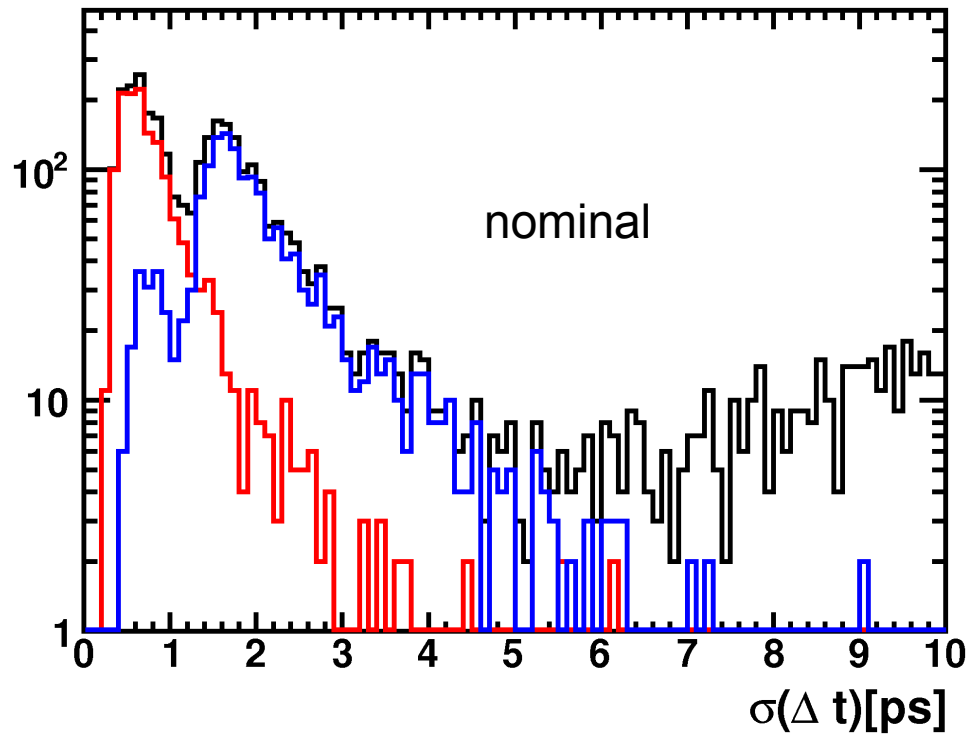
Sensitivity on S,C

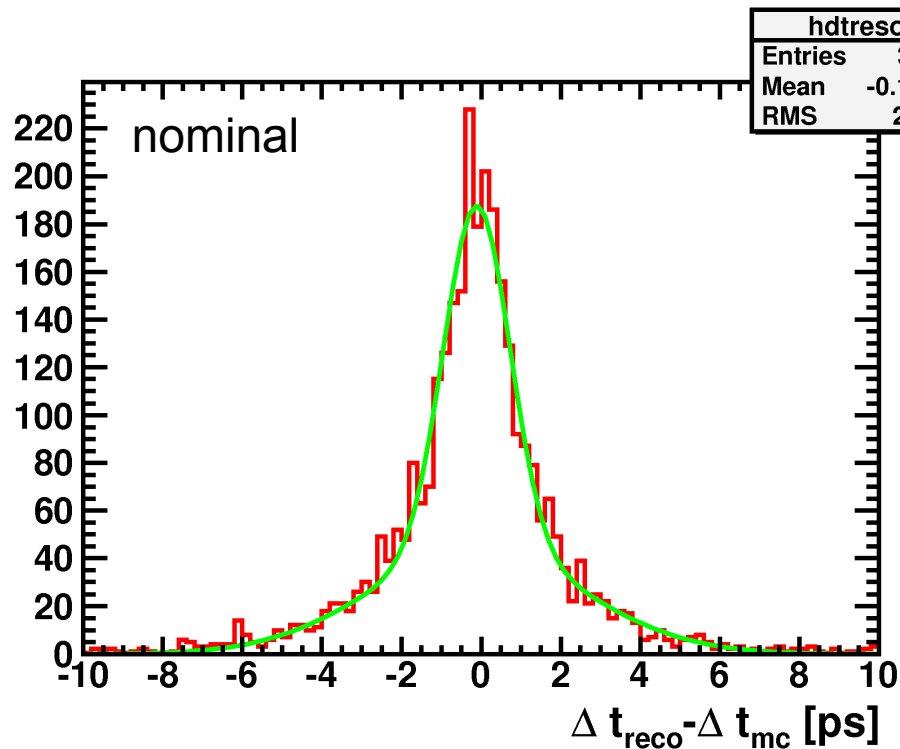- Dependence of S from $\sigma_{\Delta t}$ studied in BAD 904 for perfect tagging

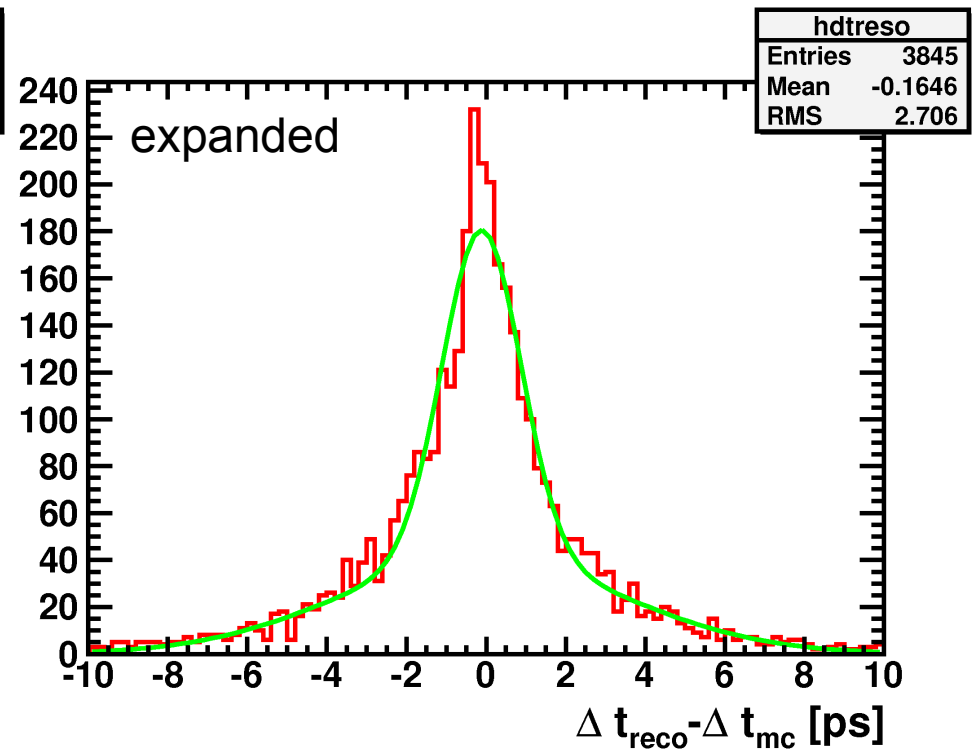 - Useful to compare different configurations assuming the dependence

    – $\sigma_S \sim \sqrt{[(1+\sigma_{\Delta t}^2/1.26^2)/f_{good}]}$

    – $\sigma_C \sim \sqrt{[1/\text{eff}]}$

Δt resolution

hdtreso	
Entries	3173
Mean	-0.1686
RMS	2.191

nominal

$\Delta t_{reco} - \Delta t_{mc}$ [ps]

r.m.s.=2.19

hdtreso	
Entries	3845
Mean	-0.1646
RMS	2.706

expanded

$\Delta t_{reco} - \Delta t_{mc}$ [ps]

r.m.s.=2.71

- Babar configuration gives r.m.s.=1.84

Preliminary estimate of Sensitivity on S,C

	rms[ps]	$f_{good}[\%]$	$\sigma_S/\sigma_S^{nominal}$	$\sigma_C/\sigma_C^{nominal}$
babar	1.84	69	0.90	0.98
nominal	2.19	72	1	1
expanded	2.71	88	1.07	1.00

- Sensitivity in nominal configuration is comparable to BaBar (10% worse on S)

- Sensitivity in expanded configuration is 10% worse than nominal on S, the same on C

Summary

- Updated study of $K_S \pi^0$ resolutions to baseline SVT configuration, compared to expanded

- Estimated sensitivity on S

- Indication of no gain using expanded SVT

Plans

- Update selection

- Implement ML fit of time dependent CPV

- Add K*γ