

SVT studies

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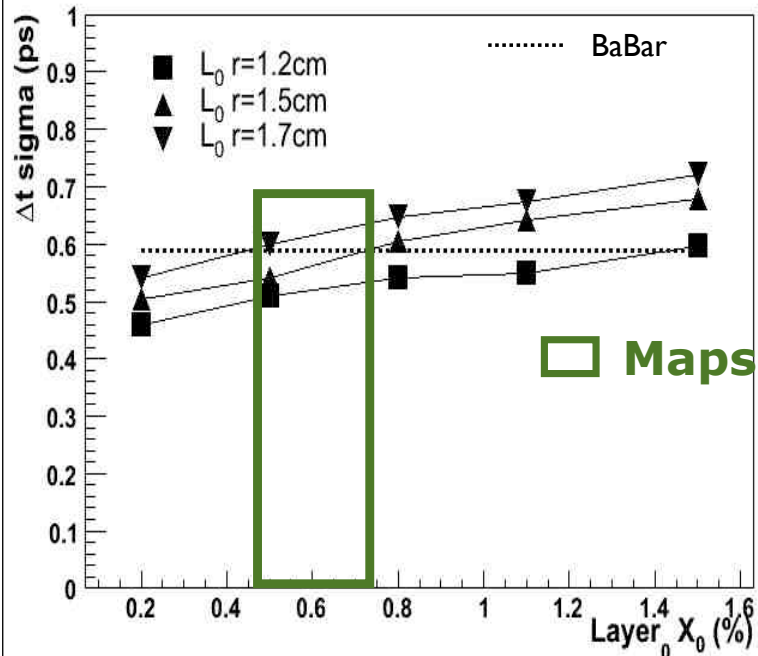
Outlook

- Proper time resolution: FastSim vs PravdaMC for $B^0 \rightarrow \pi^+ \pi^-$
- Some consideration for TD measurements for special B decay modes as $B^0 \rightarrow K_s K_s$
- Detector geometry optimization: discussion of possible criteria

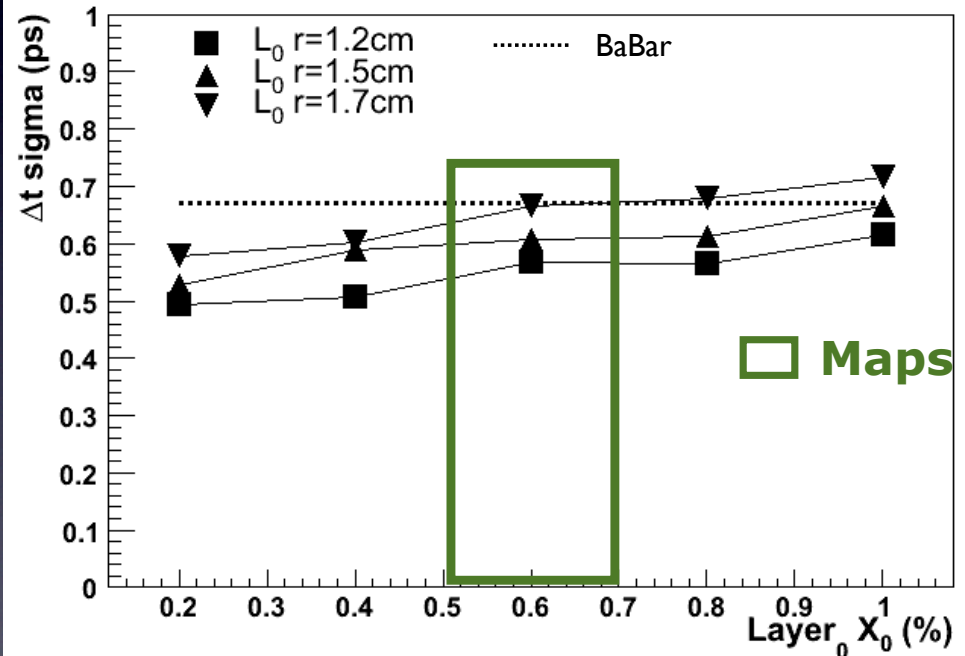
Proper time resolution vs layer₀ X₀(%)

$B_0 \rightarrow \pi^+ \pi^-$ decay mode $\beta\gamma=0.28$ beampipe $X_0 = 0.424\%$
hit resolution = $10 \mu\text{m}$

PravdaMC simulation



FastSim simulation



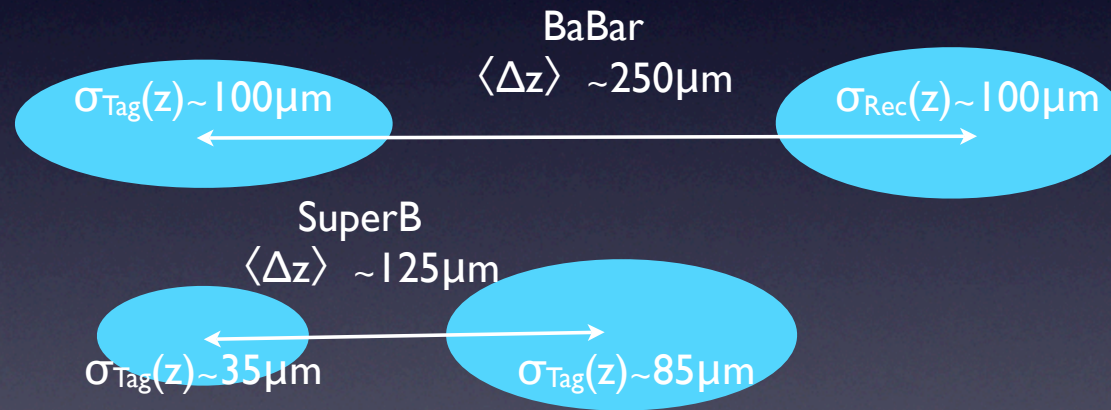
- Reasonable agreement between PravdaMC and FastSim results.
- Main result is that proper time resolution is adequate for time dependent measurements.

Small boost reduction scenario

- There is an outstanding request to reduce the CM boost to improve by a large amount the electron polarization efficiency.
- The request is to move from $\beta\gamma=0.28$ (7 vs 4 GeV) to $\beta\gamma=0.25$ (6.8 vs 4.12 GeV).
- Proper time resolution reduction (10% worst, checked on FastSim) is no critical for time dependent measurements.

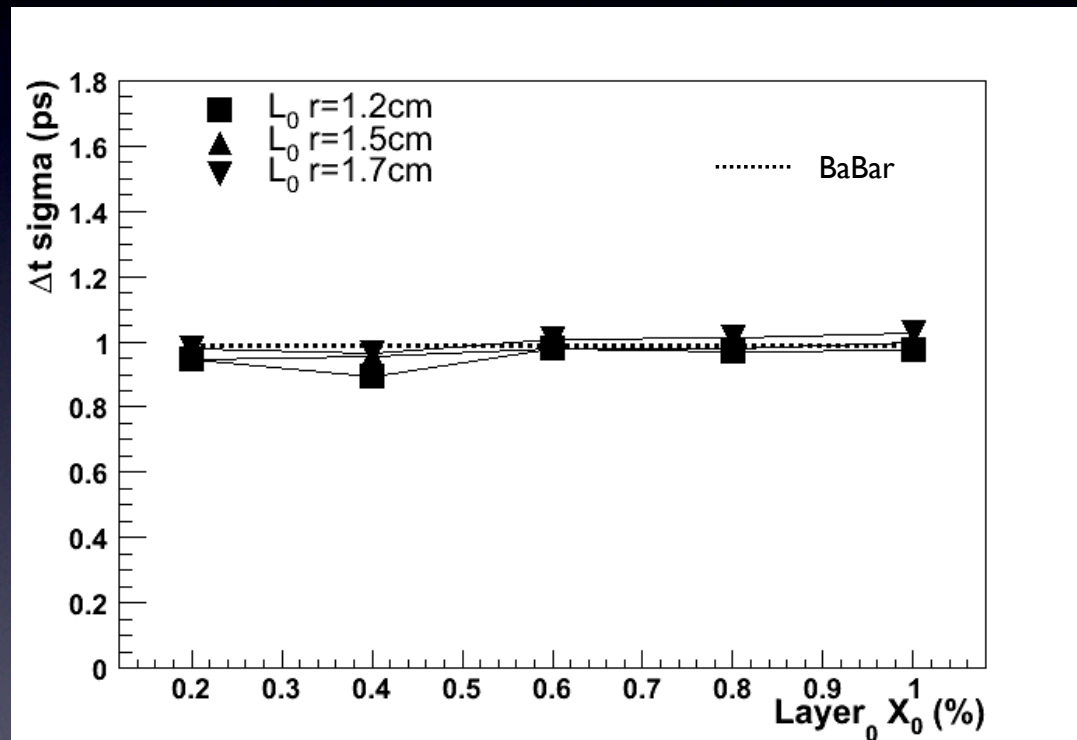
Time dependent measurements: some considerations

- B decays, with neutrals and K_S , do not benefit of layer₀ measurements. Require special attention for proper time resolution. Example for $B^0 \rightarrow K_S K_S$



Tag vertex resolution improves: MS dominating $\sigma_{\text{Tag}}(z) \sim r_{L0} \cdot \sqrt{X/X_0}$.
Reco vertex: small improvement thanks to more precise kinematical constraints from tag side

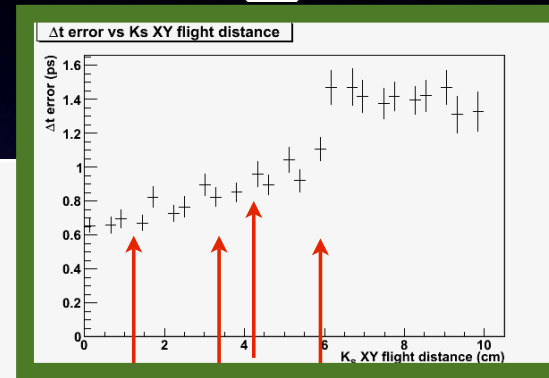
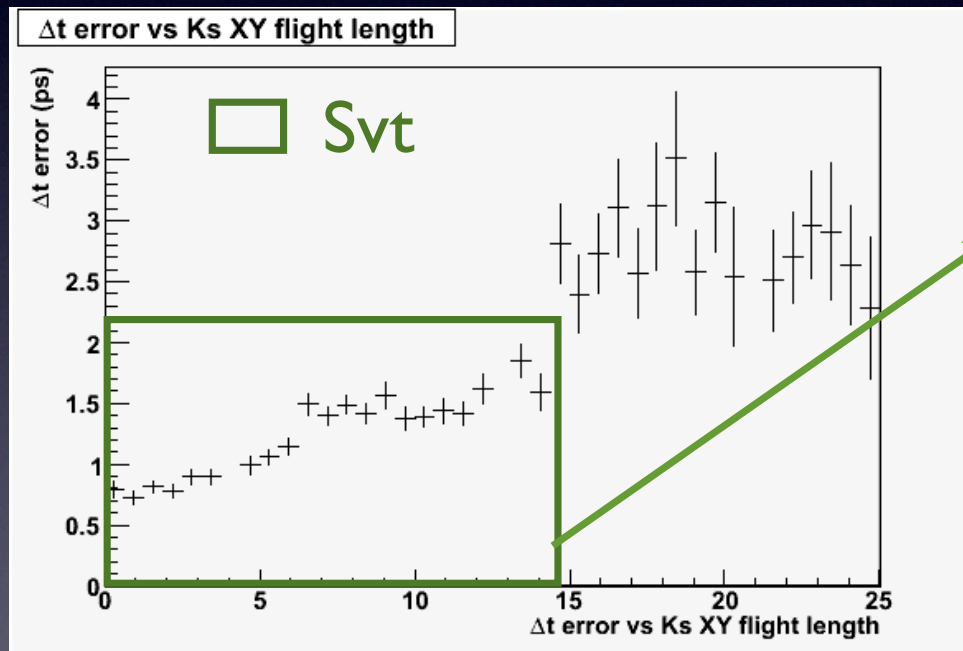
Proper time resolution for $B^0 \rightarrow K_s K_s$



Proper time resolution is comparable with BaBar one.
As expected, (almost) no relation with layer0 solution (for reco vertex).

Proper time error vs K_s XY flight length

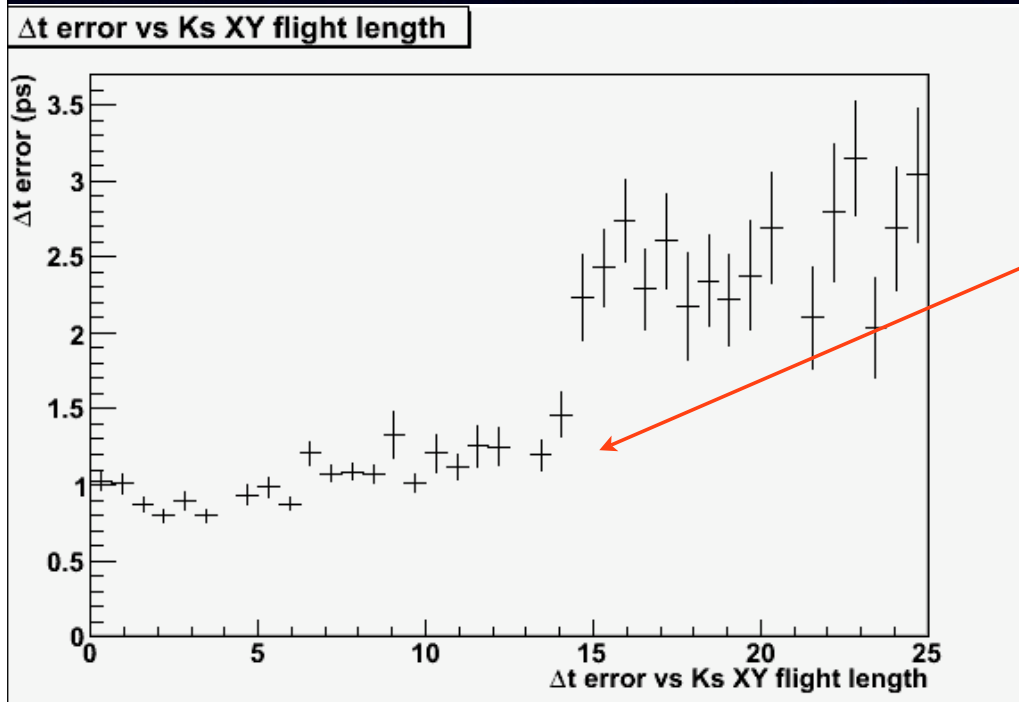
SuperB scenario



Svt internal geometry could be optimized in order to improve K_s reco efficiency and proper time determination.

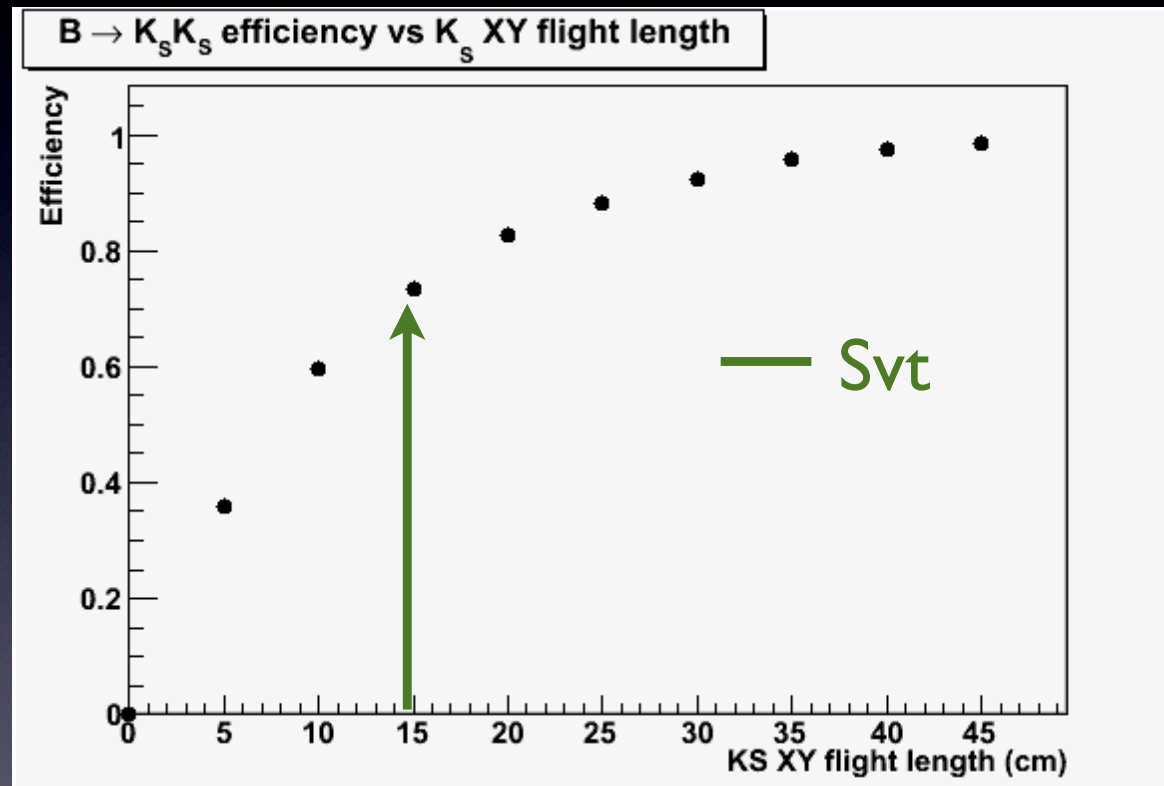
Proper time error vs K_S XY flight length

BaBar scenario



Within the SVT tracking volume
 Δt error is dominated by
Tag vertex uncertainty.
Less dependence of Δt error wrt SuperB
from the internal Svt geometry.

$B^0 \rightarrow K_S K_S$ efficiency vs K_S XY flight length



- Enlarging the Svt tracking volume would improve K_S reconstruction and Δt measurement.

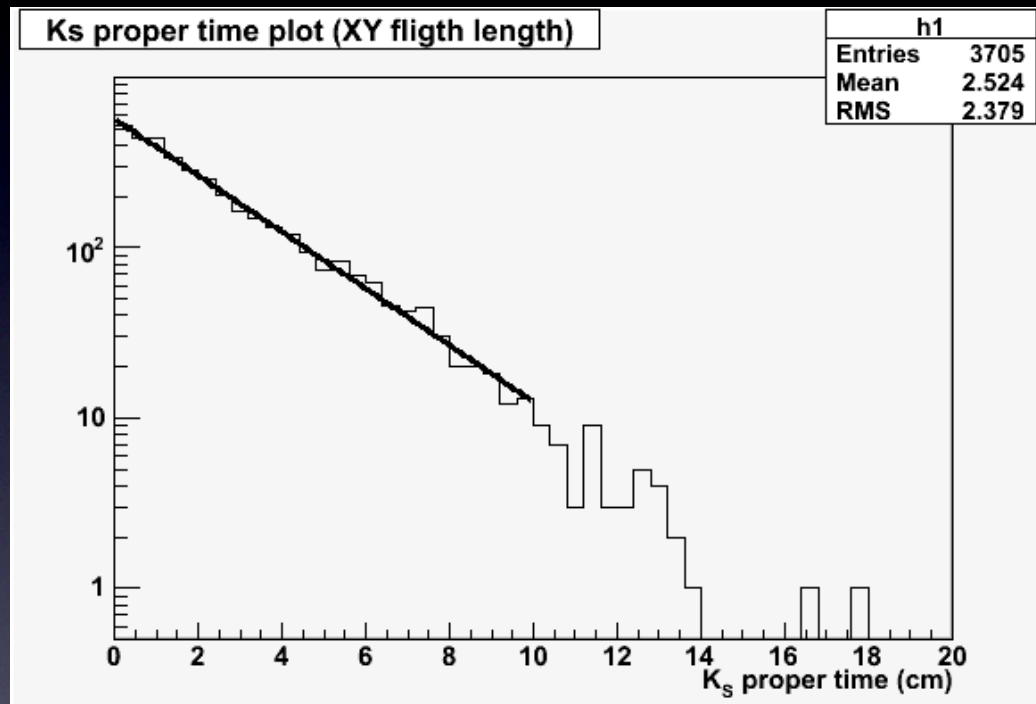
Criteria for SvT

geometry optimization

- Layer0 related: B-D vertex separation, vertexing in tau decays, continuum bkg suppression, tagging performances with vertexing info,...
- Internal SVT geometry: K_S reconstruction efficiency, Δt resolution in special B decay modes: $B^0 \rightarrow K_S K_S$, $B^0 \rightarrow K_S \pi^0(\gamma)$ (See Gabriele's talk), soft pion reconstruction efficiency,...

Back up

K_s proper time check



Naive fit to proper time, assuming constant reco efficiency, gives a lifetime of 2.6 cm