Update on SVT dE/dx

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Reminder...

- Last time I reported on fixing tan I dependence of dE/dx pulls
- After the meeting, I took Matteo's advice on calculating the expected dE/dx in a way that guarantees good pull results --> Done.
- From Leonid's recent talk:



Next issues

- 1. Separation power of dE/dx at high momentum:
 - 1. about 0.5 for K/pi in fastsim --> too good!
- Minimum of K/pi separation (where dE/dx curves for K and pi cross) is at different momentum compared to BaBar
 - 1. in fastsim, SVT and DCH have same minimum (~0.9 GeV) giving no separation power at that momentum

Separation at high-p



Very little expected separation power above ~ 1 GeV

- I have not tuned dE/dx
 in fastsim to reproduce
 separation behavior
- Tuned sigma for MIPS:
 - assumed this would be good enough

Separation at high-p (2)



- Look at e/π because no K/ π • plot in BAD 1500
- Fastsim is optimistic at high-p ٠
- Pessimistic at low-p ۰
- Cannot easily tune to make • fastsim look like Babar
 - introduce p-dependent _ sigma?
- Is Babar plot accurate? ٠
 - Based on calibration results -

- overly optimistic?

Minimum in K/ π separation

- In Babar, the momentum where the K/π separation goes to 0 is 1.7 GeV for SVT and 1.1 GeV for DCH
 - I.e. they are not the same, so all momenta are "covered" by either SVT or DCH
- In fastsim, the 0-point occurs at the same value (0.9 GeV) for SVT and DCH, leading to a "hole" in the coverage



Minimum in K/ π separation (2)

- Actually, I think you expect the min-momentum to be the same for DCH and SVT if you use Bethe-Bloch to calculate the <dE/dx> values
- In Babar, the minima are shifted due to (presumably) detector/electronics effects that are not simulated in fastsim
- One could put in an ad hoc fix by shifting one of the particle species dE/dx curves, but this will cause additional things to move around, like separation



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Some thoughts

- 1) We are using BaBar SVT dE/dx performance as a baseline
 - a) how well do we know the baseline? Are the separation plots in BAD 1500 realistic? Do we know what we are aiming for?
 - b) the BaBar assumption is used in absence of anything better. However, in Trieste people are working on SVT dE/dx model based on the proposed SuperB electronics. I.e. our baseline will likely change
- 2) If we really want to reproduce fairly well the particle separation plots, we probably need to do some development work on how SVT dE/dx is generated and simulated
 - current code/parameters not flexible enough
- 3) Given the points above, one may ask if the effort required to satisfy 2) is justified, especially given 1a) and 1b), above.
- 4) UPDATE: Given Matteo's good results using BaBar data, this should definitely be investigated for SVT as well.