PID Lists in V0.2.2

Nicolas Arnaud, Leonid Burmistrov

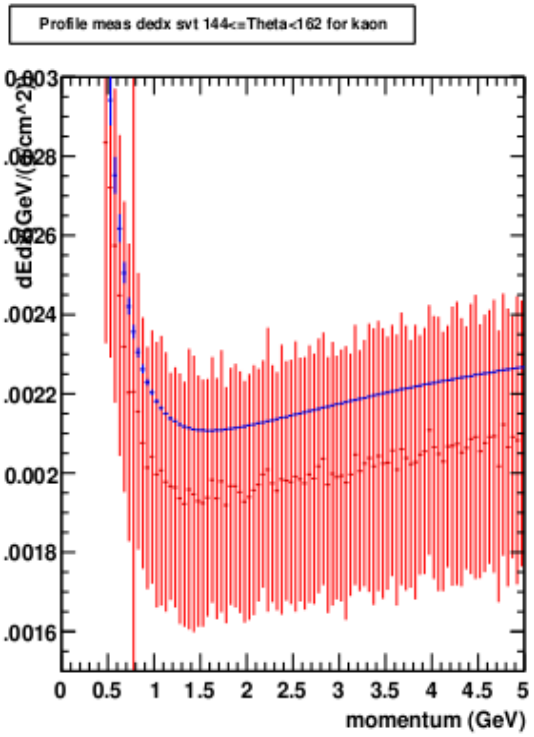
→ SVT, DCH, DIRC in V0.2.2

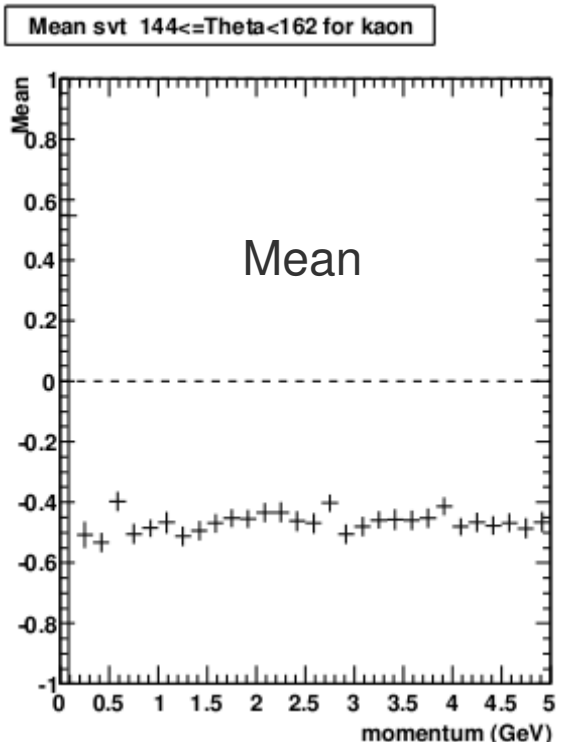
→ Pion and Kaon LH Selectors in V0.2.2

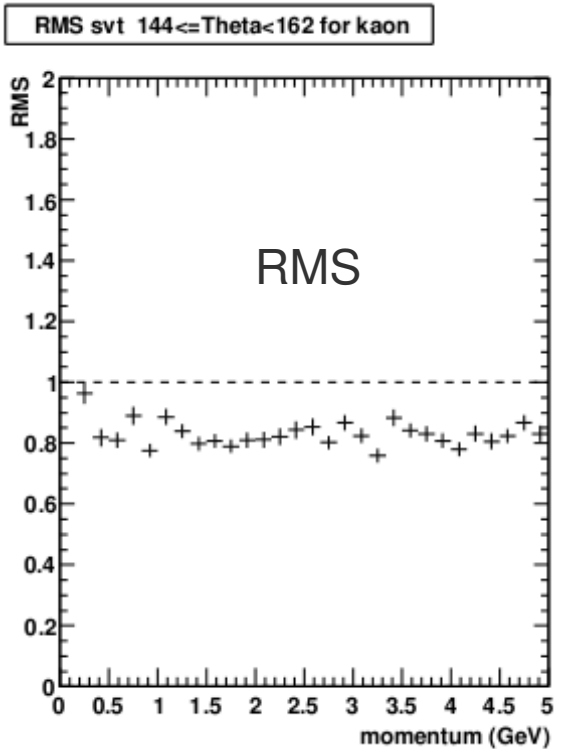
We work with BaBar configuration

Comparison between old and new SVT

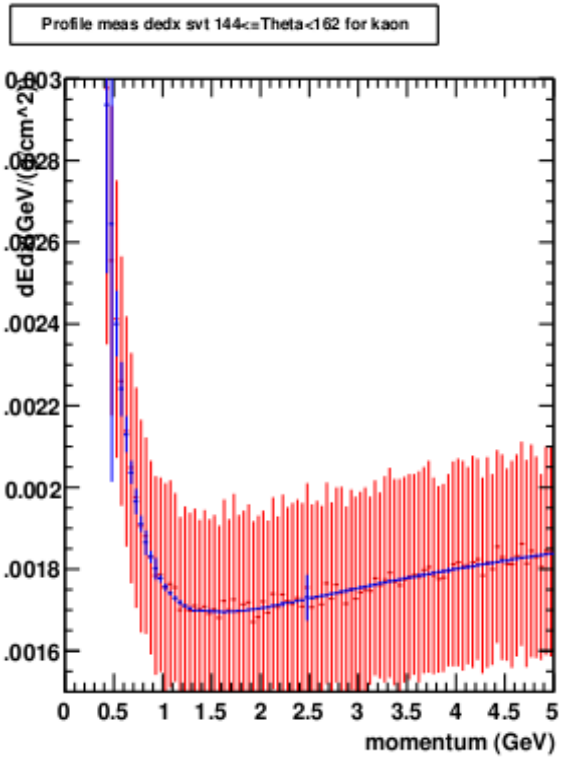
V0.2.1

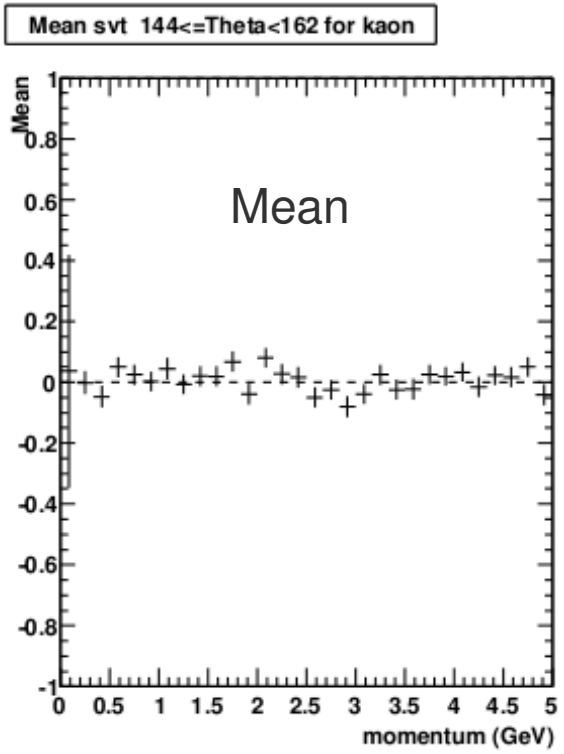


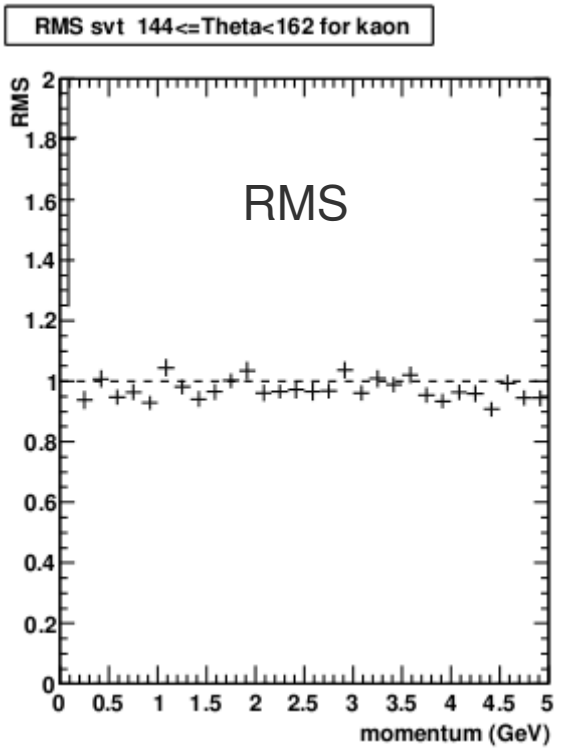




V0.2.2



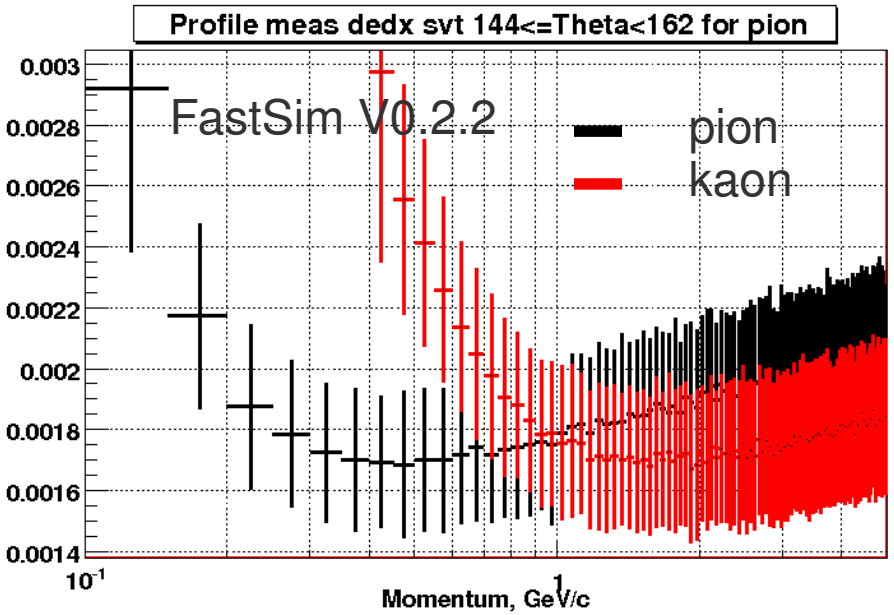


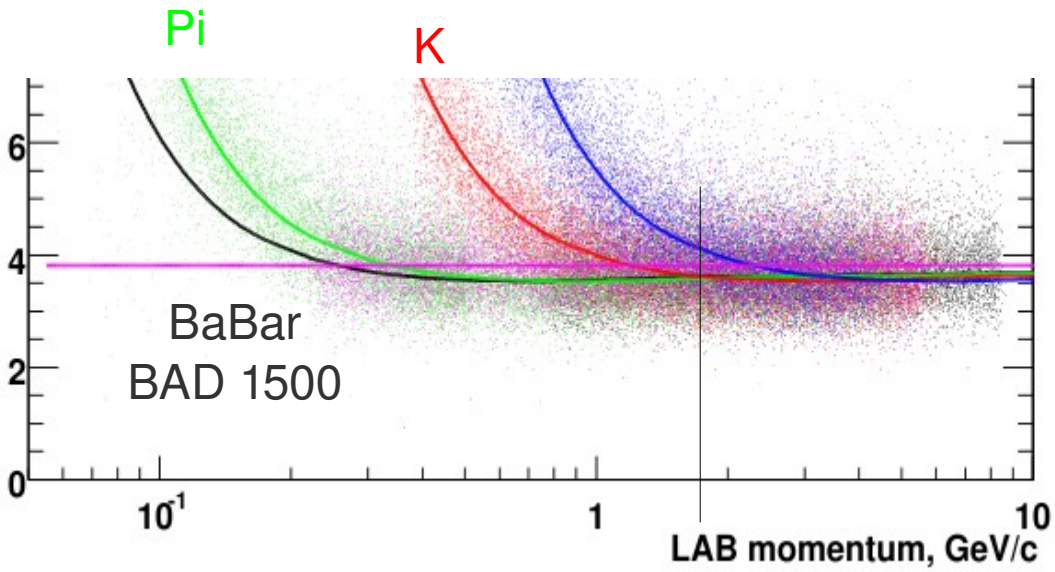


Known problem of SVT. Reminder

Pulls look like very good for the SVT. But one more known problem exists for this subsystem

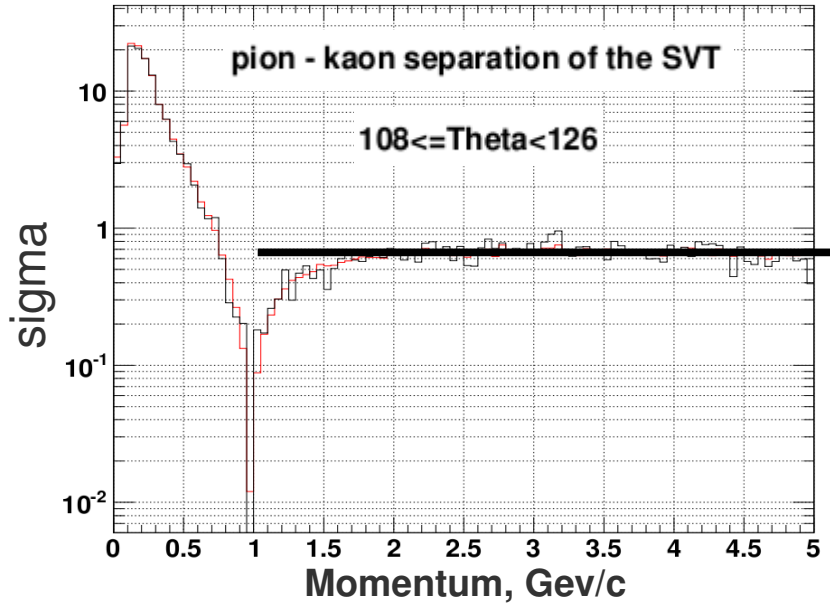
→ Minimum of the Pi/K separation is in the wrong place





Minimum is at 0.9-1 GeV/c

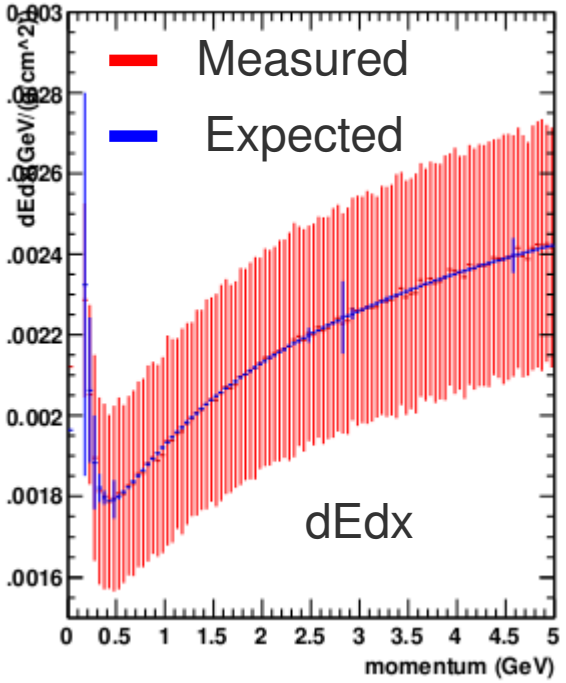
Minimum is at 1.7-1.8 GeV/c

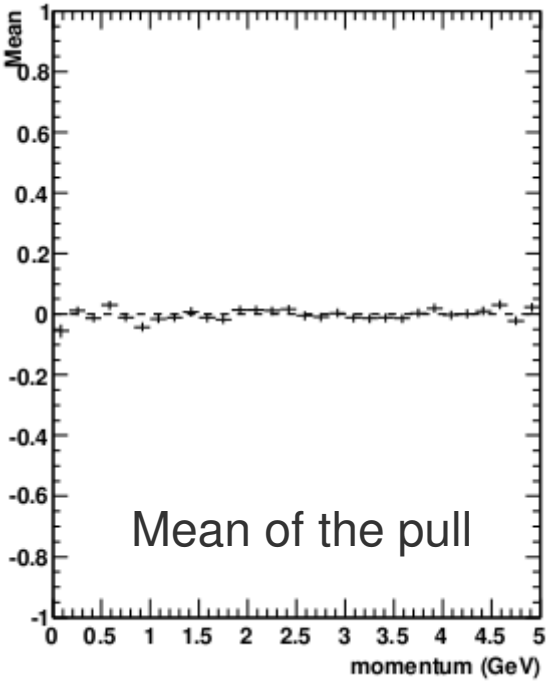


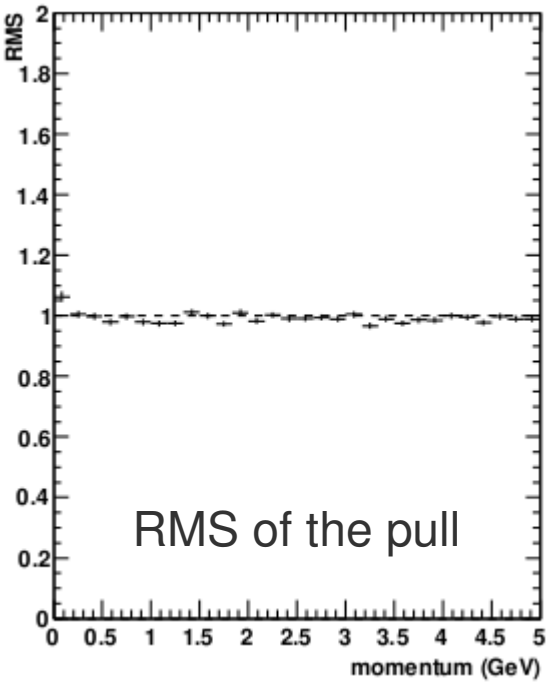
0.7 sigma separation for the SVT at high momentum region. This is function of theta

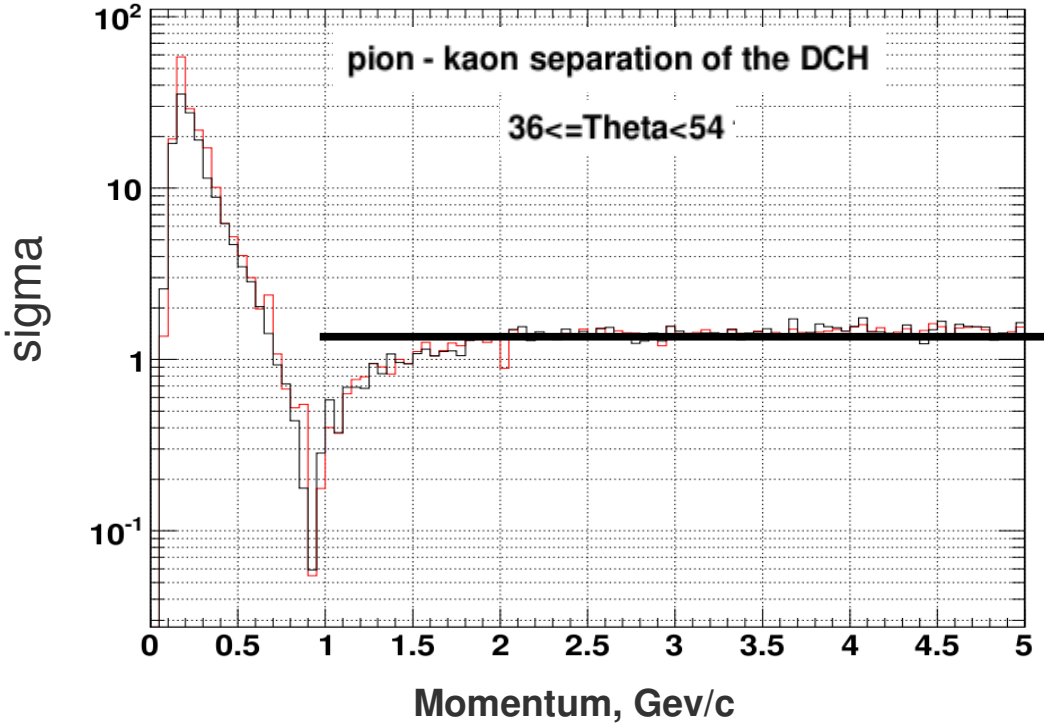
We have to compare with BaBar FullSim

DCH





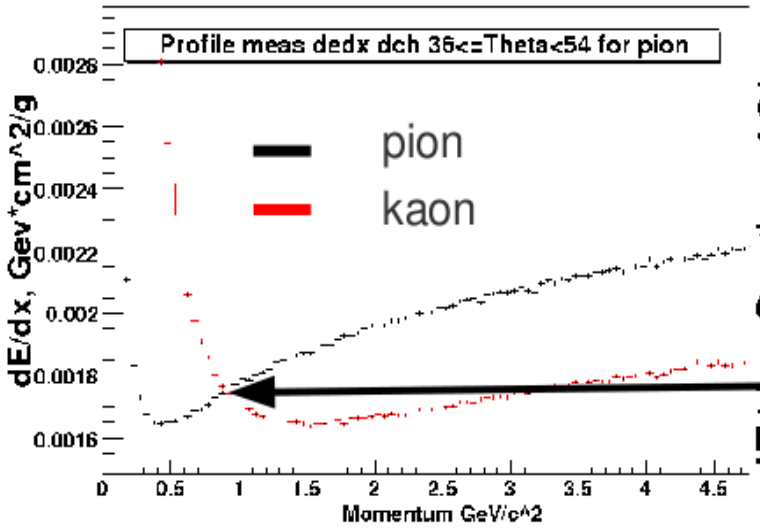




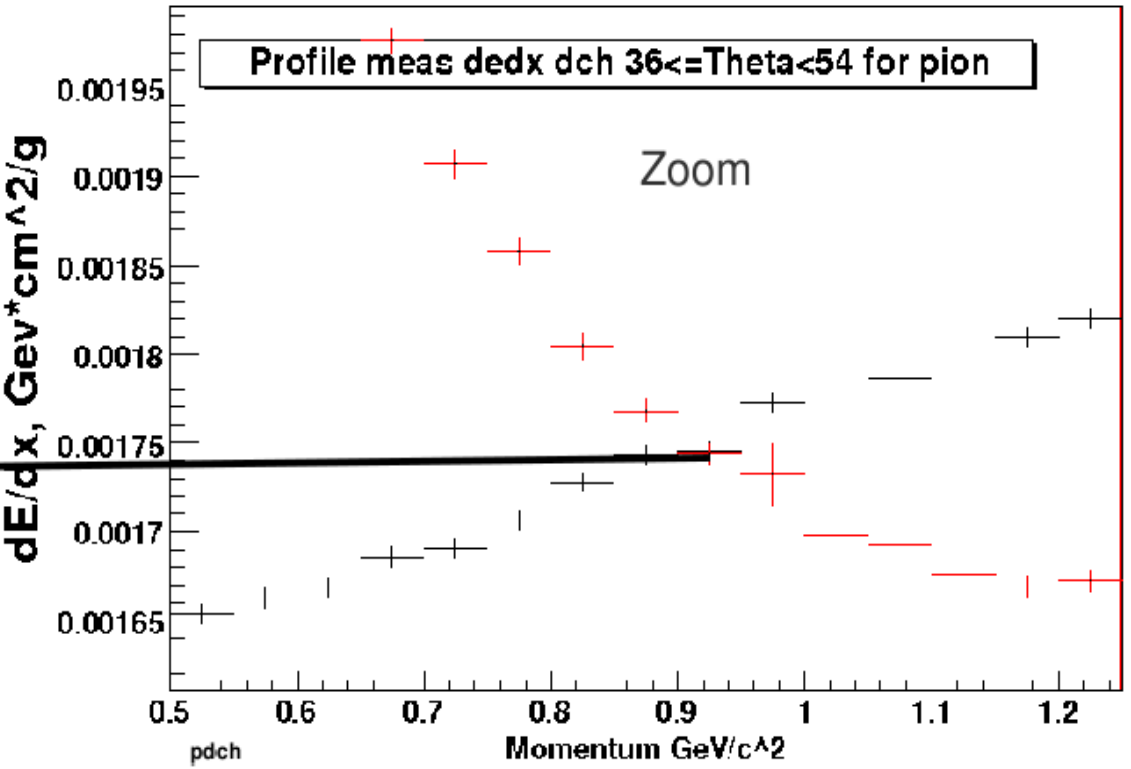
1.5 sigma separation for the DCH at high momentum region. This is function of theta.

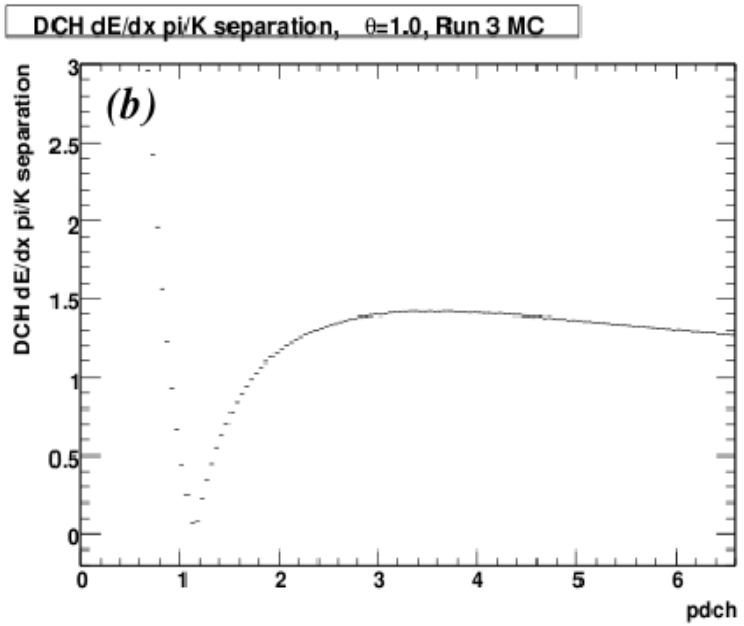
We have to compare with BaBar FullSim

Known problem of DCH. Reminder



Null K/Pi separation is at 0.92 GeV in FastSim

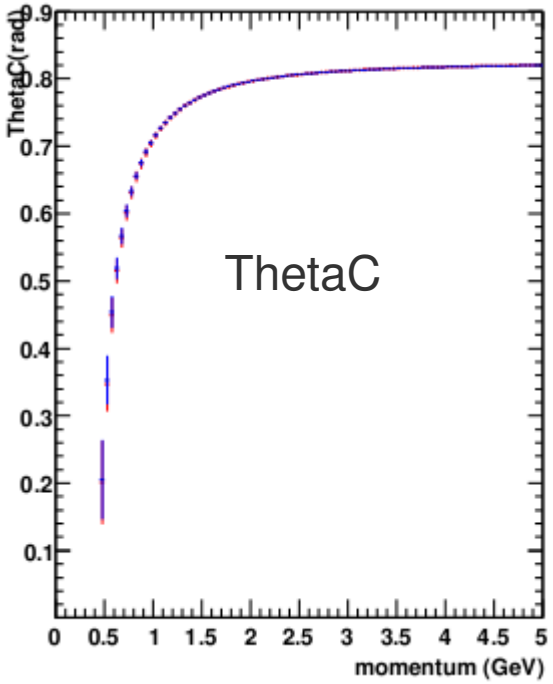




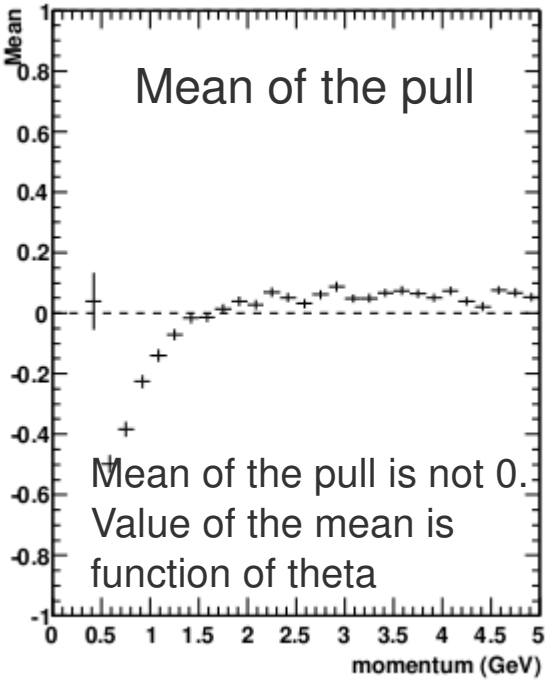
Null K/π separation is at 1.1 GeV for BaBar BAD 1500

Matteo : this difference comes from the way dE/dx is simulated in FastSim (Gaussian instead of Landau)

DIRC

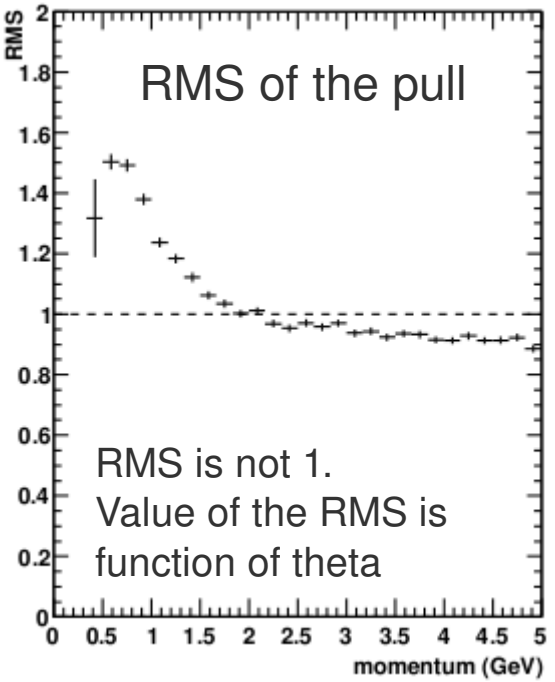


ThetaC



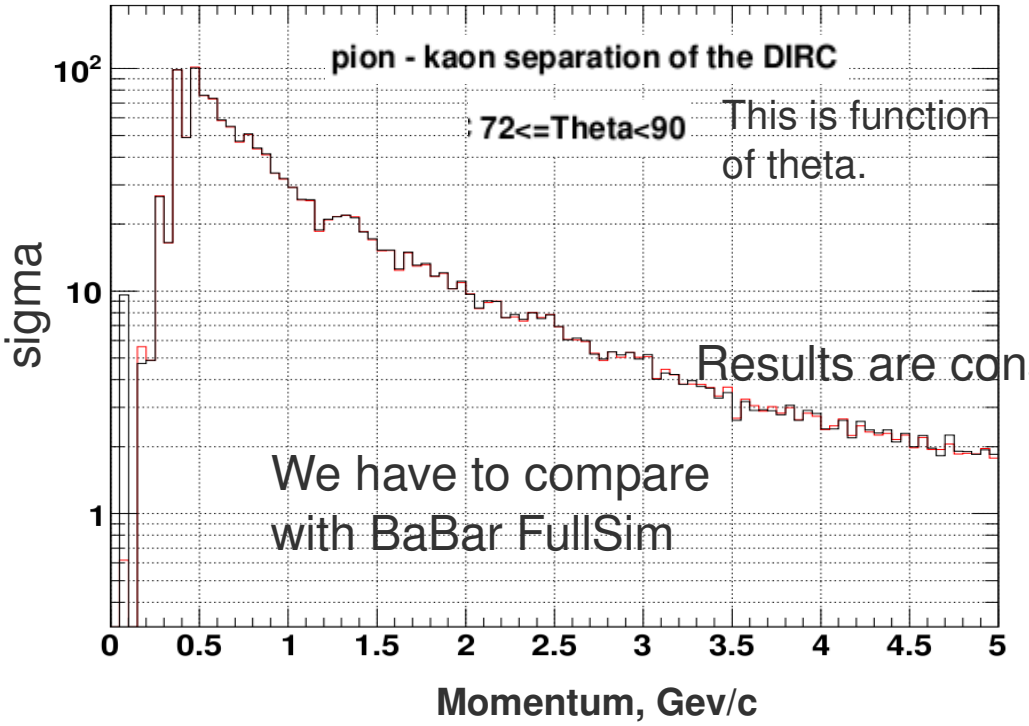
Mean of the pull

Mean of the pull is not 0.
Value of the mean is function of theta



RMS of the pull

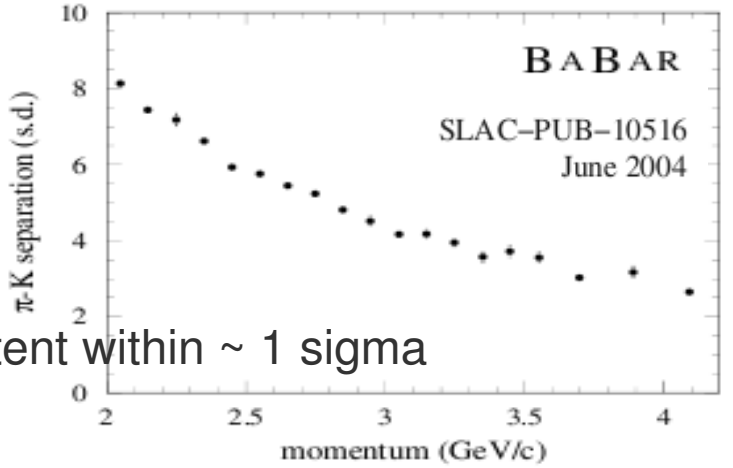
RMS is not 1.
Value of the RMS is function of theta



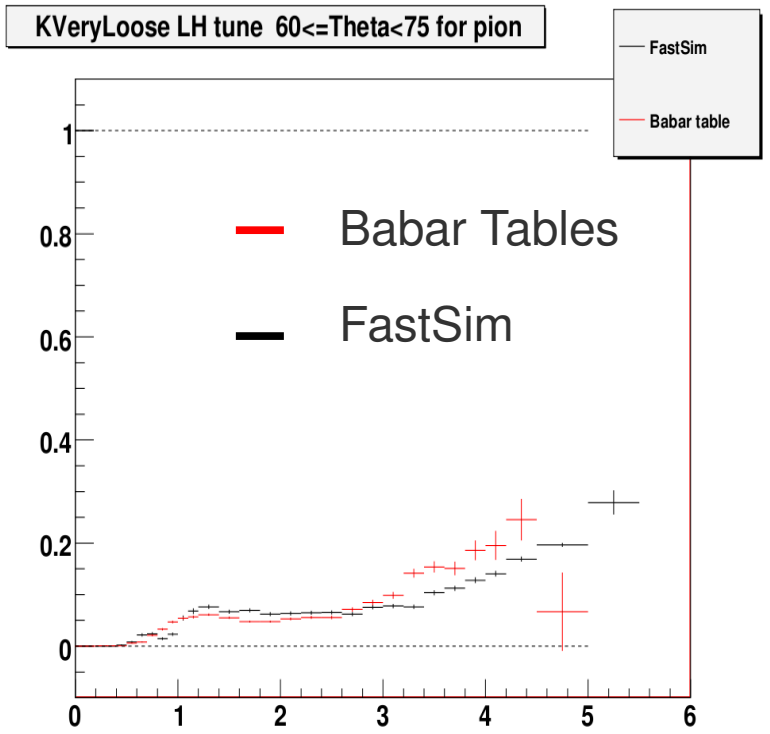
This is function of theta.

We have to compare with BaBar FullSim

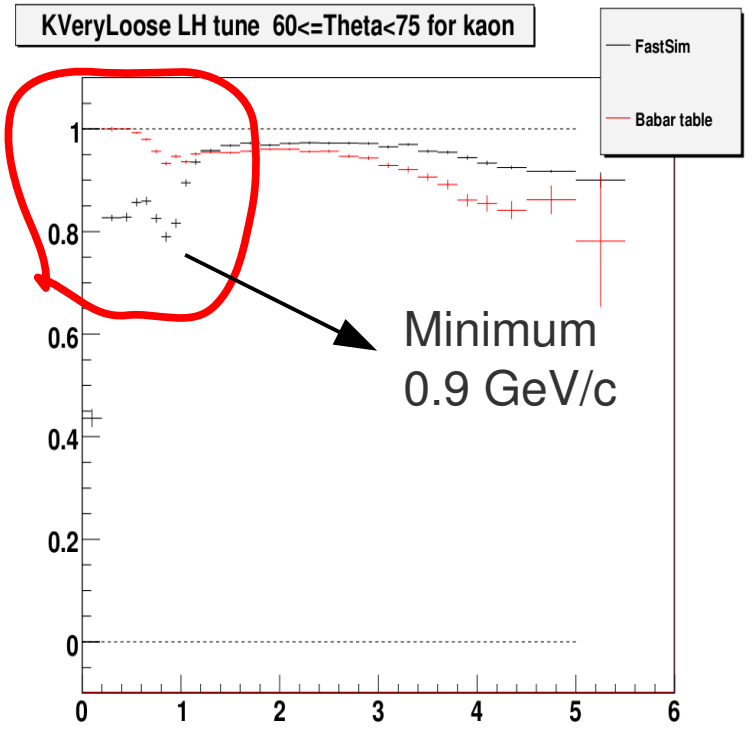
Results are consistent within ~ 1 sigma



The pion-kaon separation power is defined as the difference of the mean Cherenkov angles for pions and kaons assuming a Gaussian-like distribution, divided by the measured track Cherenkov angle resolution. As shown in Figure 54, the separation between kaons and pions is about 4 σ at 3 GeV/c declining to about 2.5 σ at 4.1 GeV/c.

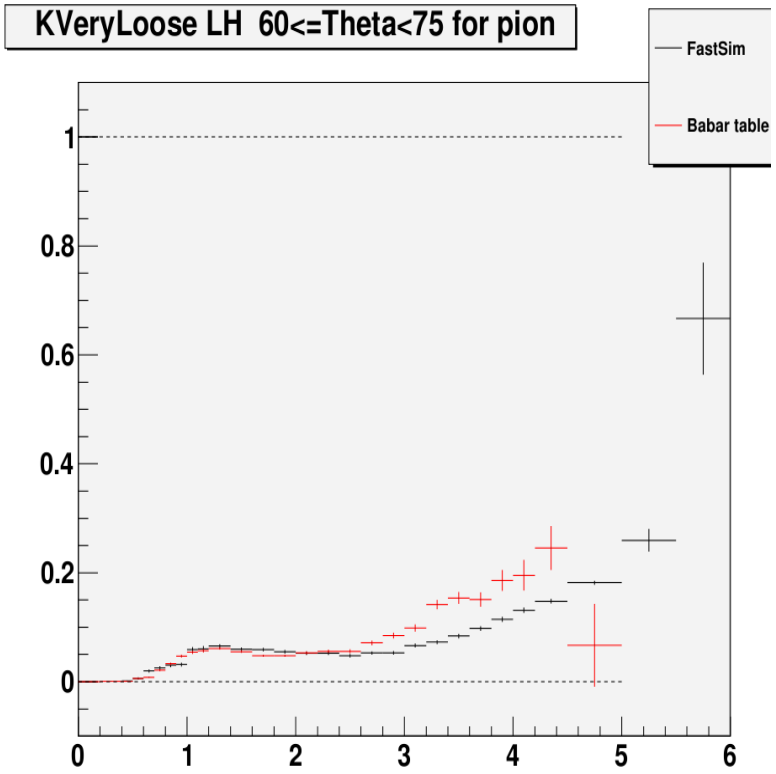


Kaon Very Loose Selectors in barrel region

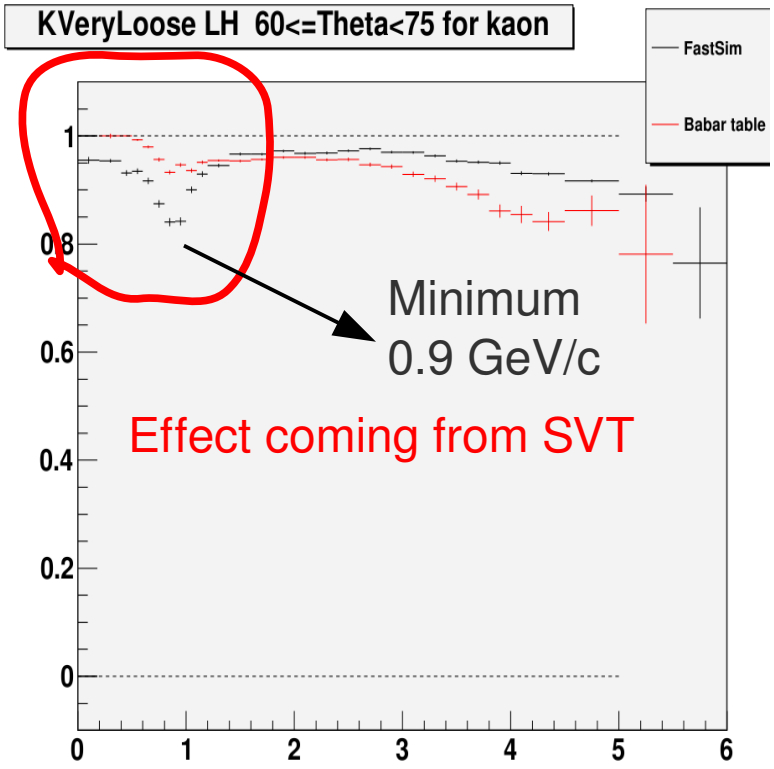


V0.2.1
(no SVT)

Same cuts



V0.2.2
(with SVT)

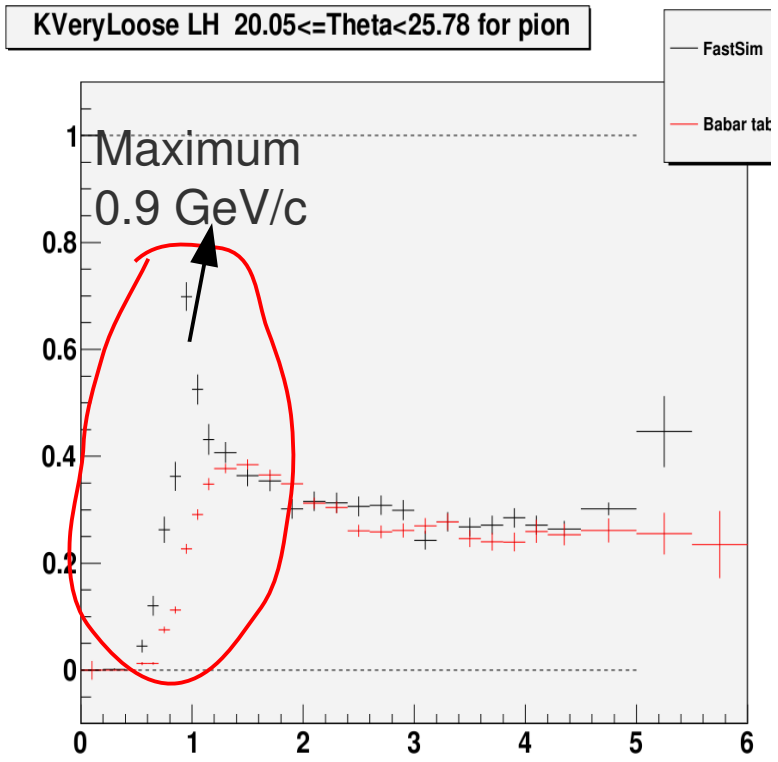


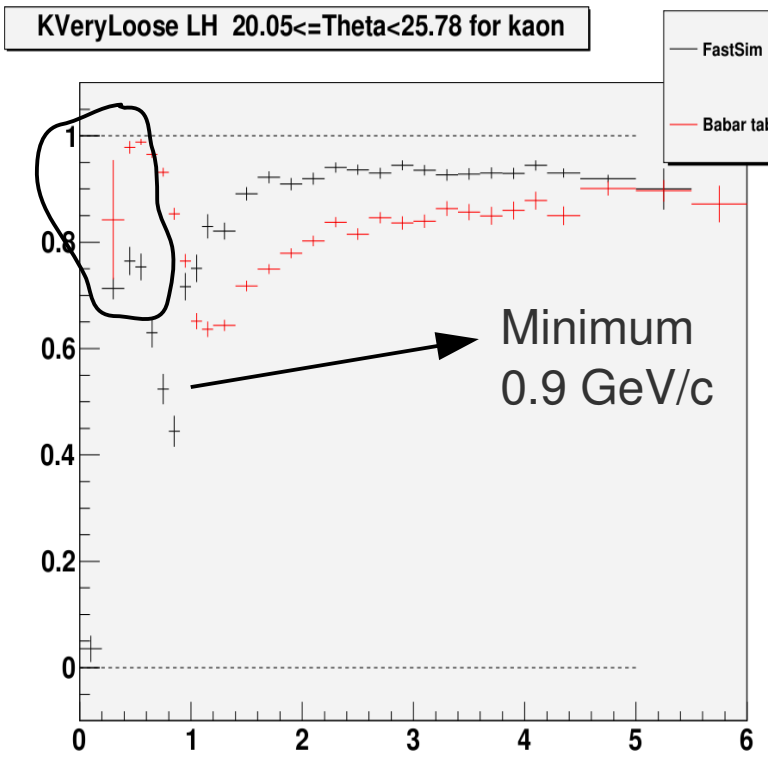
Kaon Very Loose LH Selector in forward region

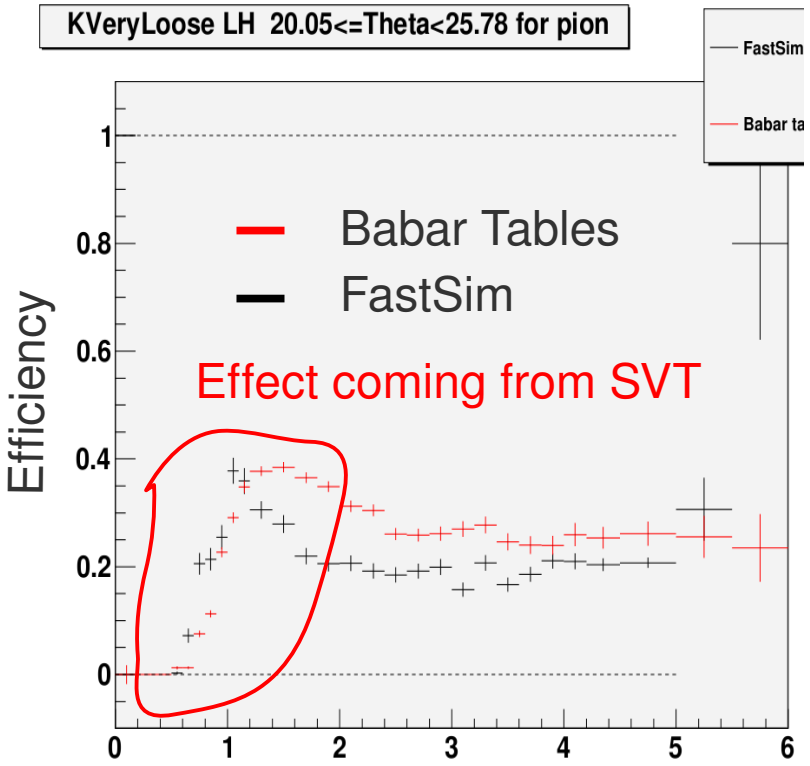
V0.2.1
(no SVT)

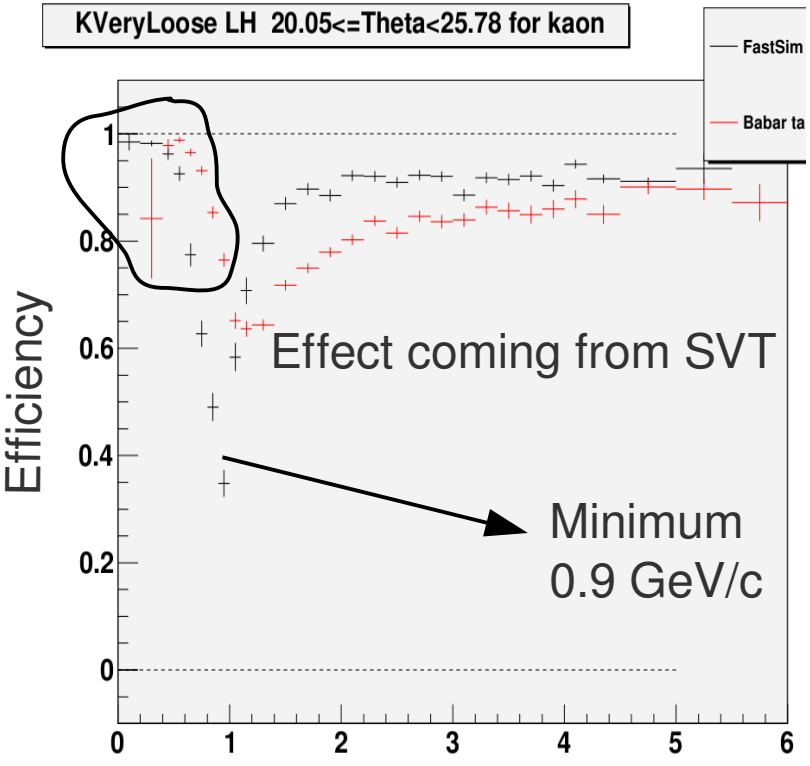
Same cuts

V0.2.2
(with SVT)

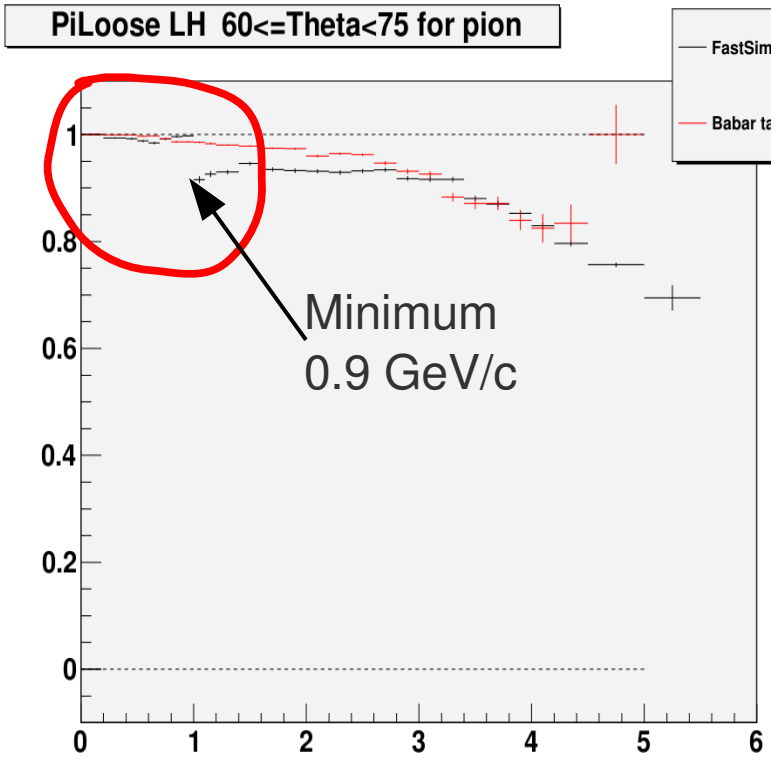




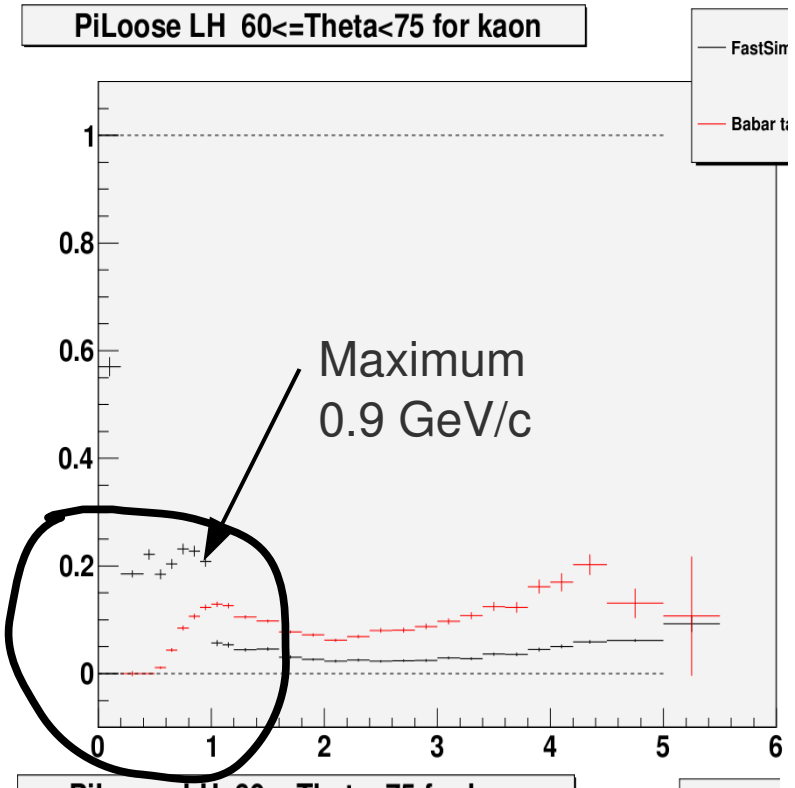




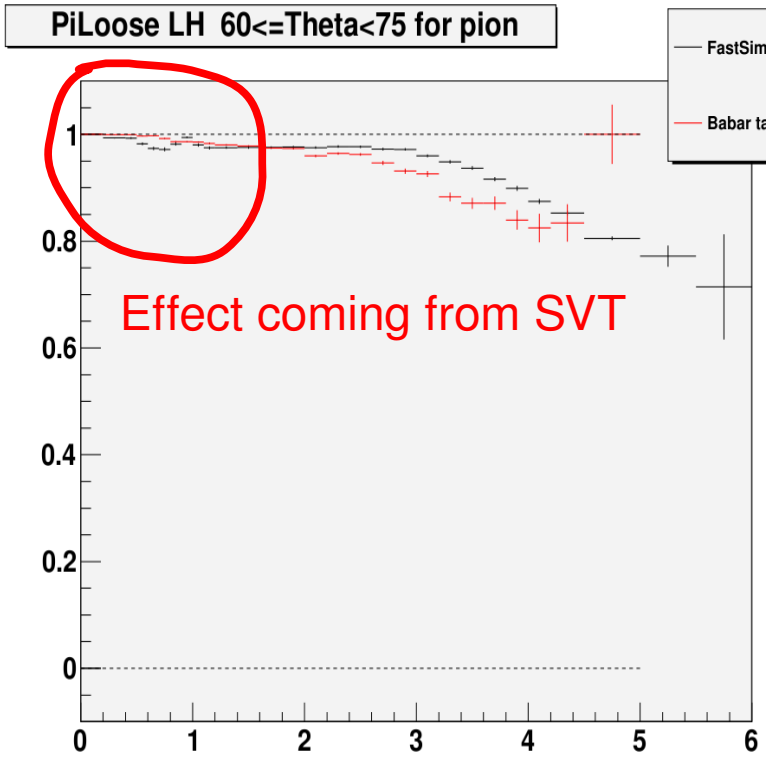
Pion Loose LH Selector in barrel region



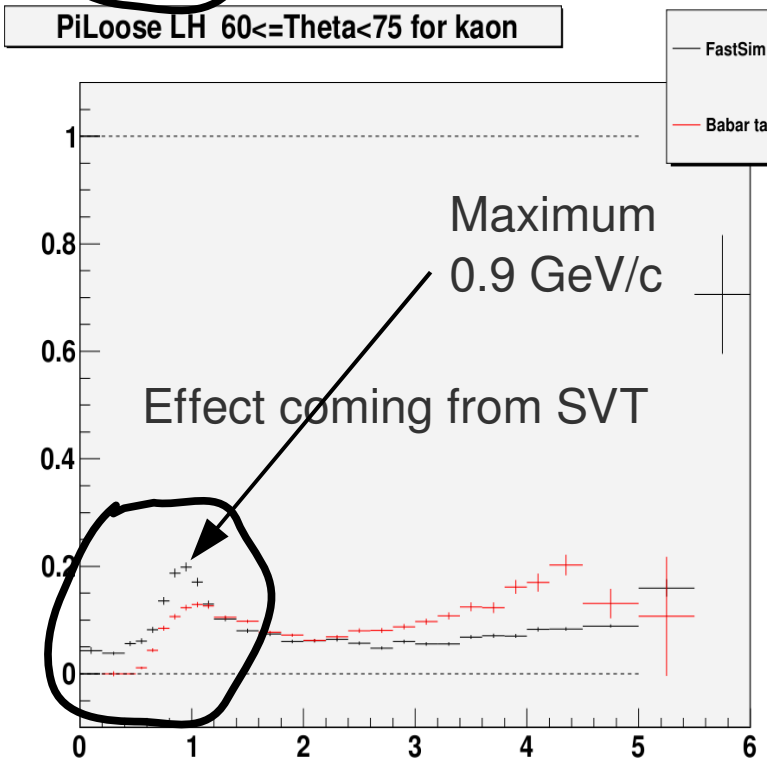
V0.2.1
(no SVT)



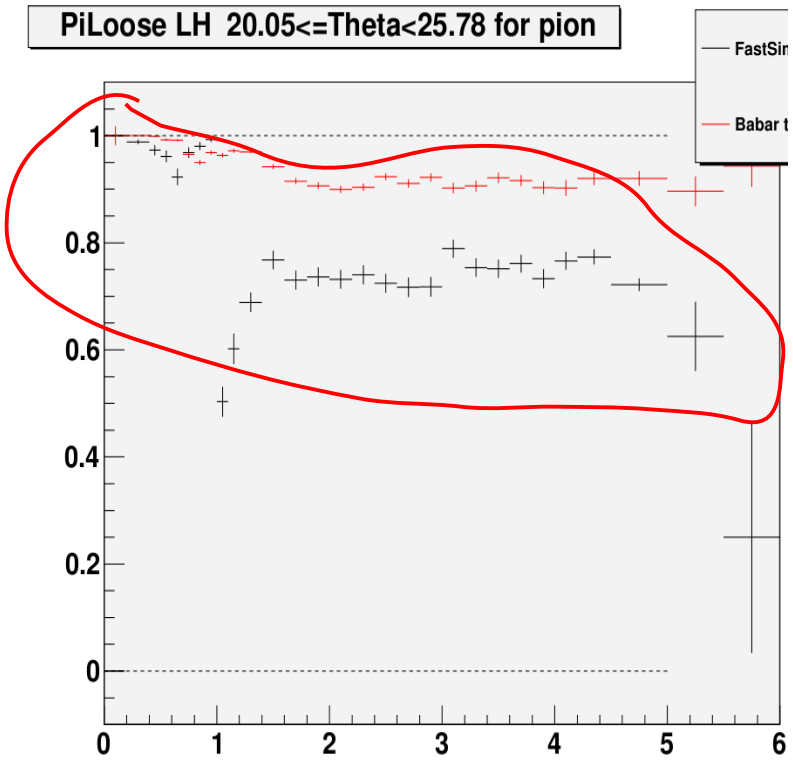
Same cuts

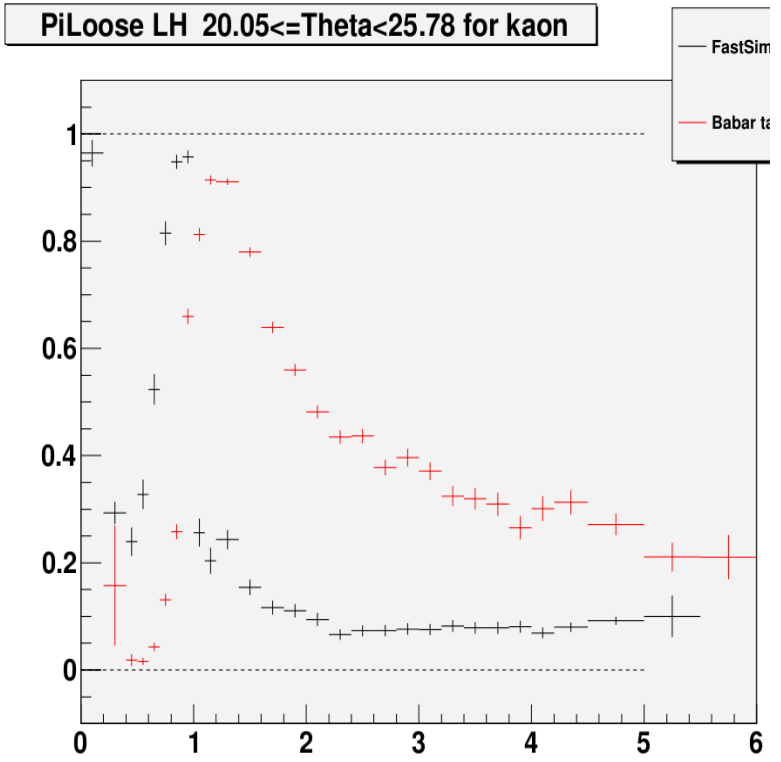


V0.2.2
(with SVT)



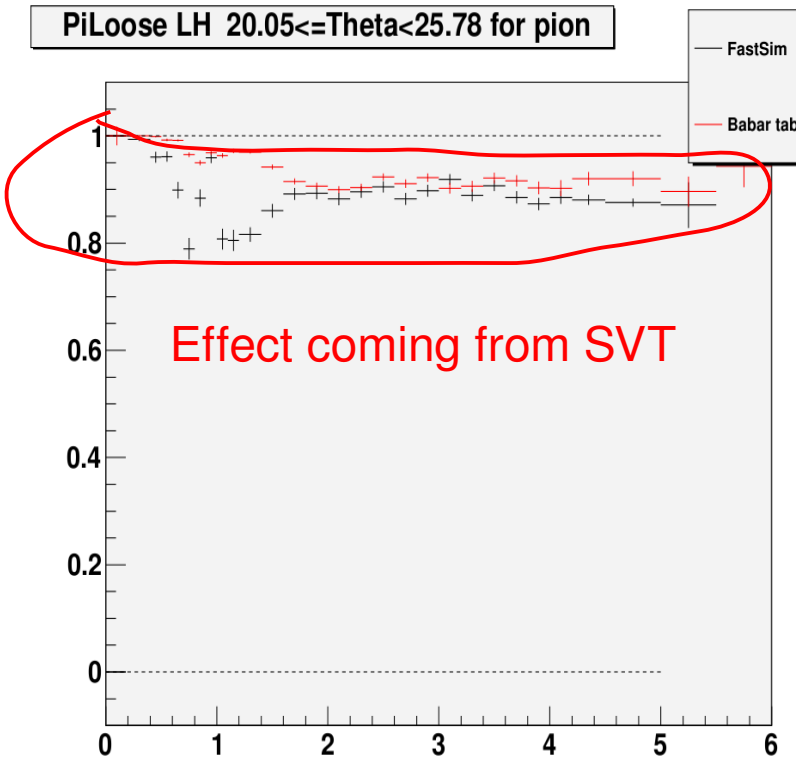
Pion Loose LH Selector in forward region



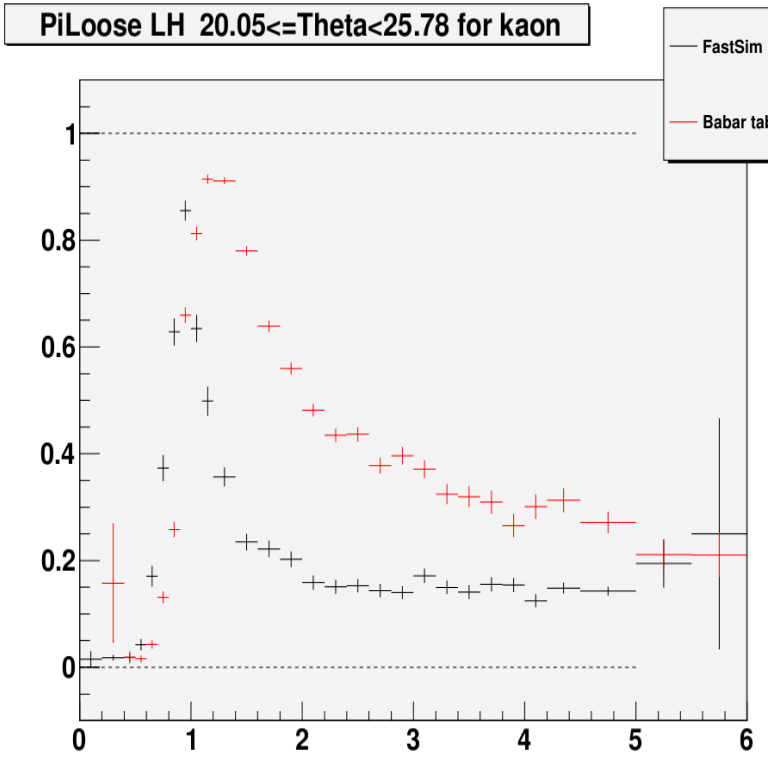


V0.2.1
(no SVT)

Same cuts



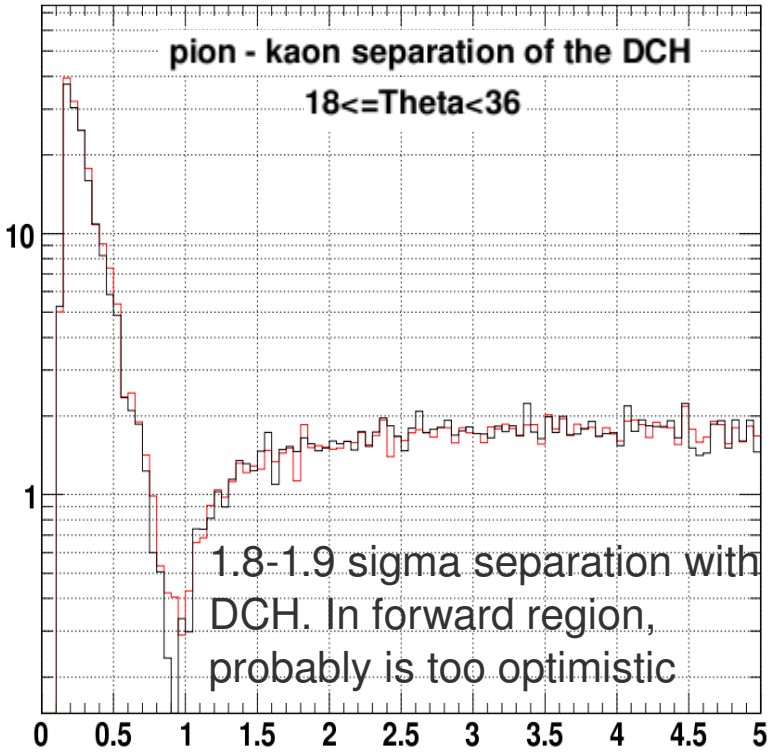
V0.2.2
(with SVT)



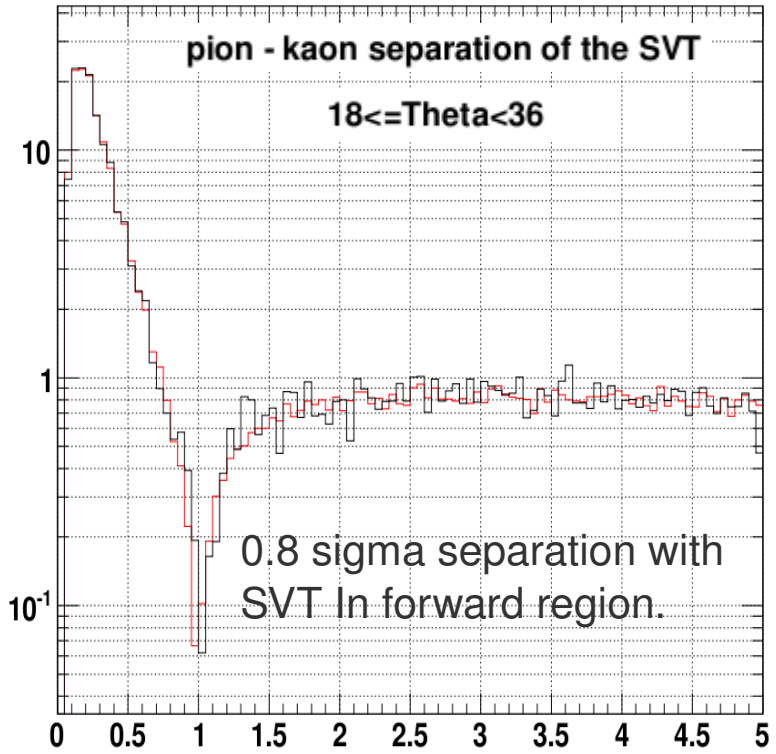
Explanation of the minimum seperation at 0.9 GeV/c

Two subsystems have minimum K/Pi separation ability at the same momentum 0.9 GeV/c this create “resonance” of bad identification. Which is not the case for BaBar where these minimums are different.

Momentum GeV/c



Momentum GeV/c



Quality plots

SVT

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitMean_svt.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitRMS_svt.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/dEdxvsP_svt.pdf

http://www.slac.stanford.edu/~burmist/BaBar_V0.2.2/PullsAndQuality/PionKaonSeperation_svt.pdf

DCH

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitMean_dch.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitRMS_dch.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/dEdxvsP_dch.pdf

http://www.slac.stanford.edu/~burmist/BaBar_V0.2.2/PullsAndQuality/PionKaonSeperation_dch.pdf

DIRC

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitMean_thetc.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/PullFitRMS_thetc.pdf

http://www.slac.stanford.edu/~burmist/BaBar_SVTon/PullsAndQuality/ThetaCvsP_drc.pdf

http://www.slac.stanford.edu/~burmist/BaBar_V0.2.2/PullsAndQuality/PionKaonSeperation_drc.pdf

Selectors

http://www.slac.stanford.edu/~burmist/BaBar_V0.2.2/

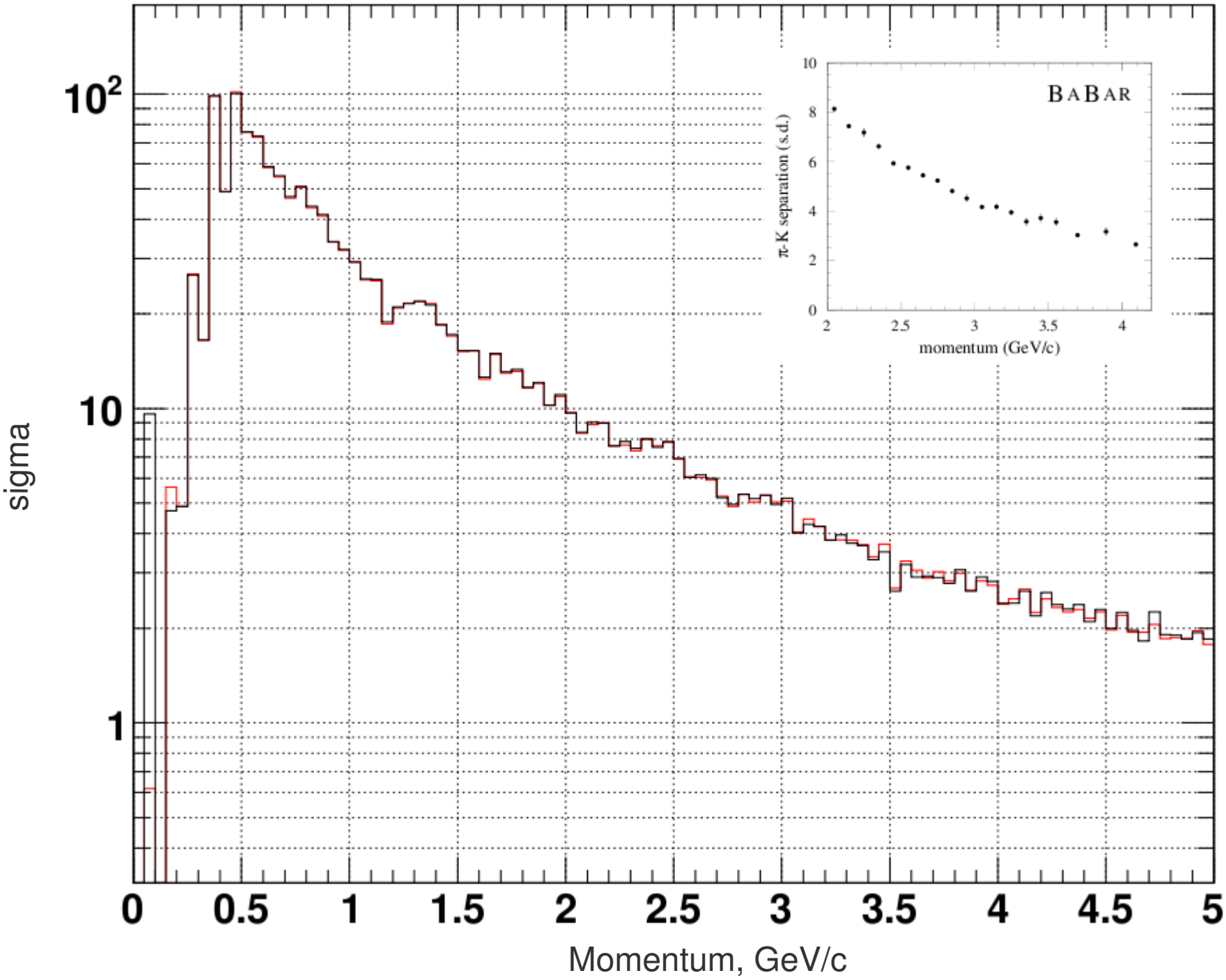
Conclusion

Test of the pulls from main subdetectors was done.

- SVT – Ok
- DCH – Ok
- DIRC – still need to be improve

New selectors for Pi and K was obtained, they look like much better then before

Backup slides


sigma
10^2
10
1
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Momentum, GeV/c
BABAR
π-K separation (s.d.)
momentum (GeV/c)
10
8
6
4
2
0
2
2.5
3
3.5
4