
HLT-HFT Simulation

Hongwei Ke¹, Hao Qiu^{2,3}, Xiangming Sun⁴

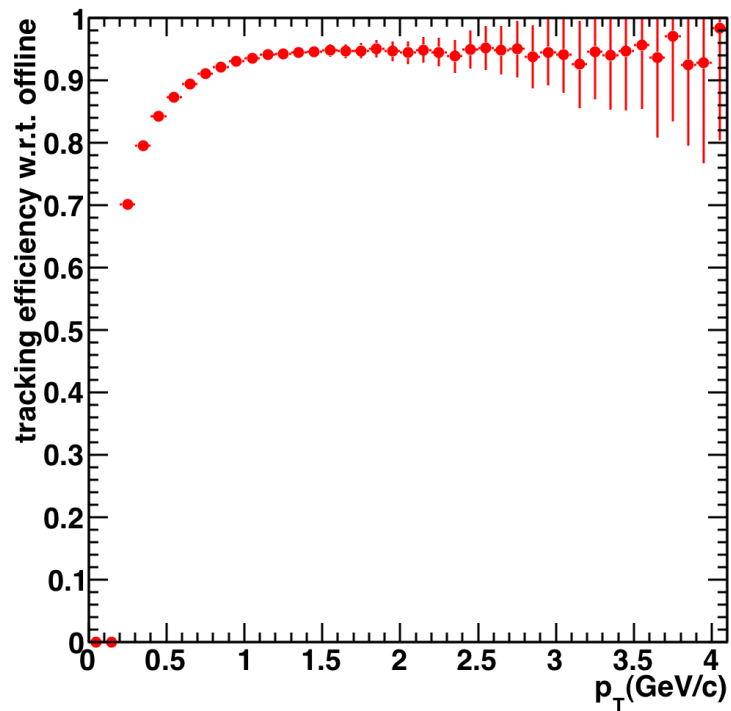
1. Institute of Particle Physics, Huazhong Normal University
 2. Institute of Modern Physics
 3. Brookhaven National Laboratory
 4. Lawrence Berkeley Laboratory
-

Outline

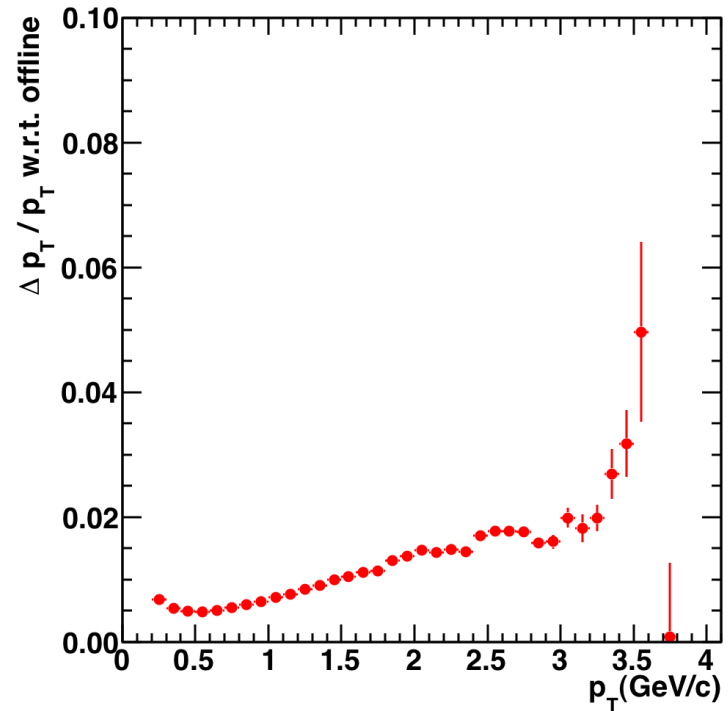
- HLT tracking performance (TPC)
- HLT tracking with HFT hits

HLT tracking performance (TPC)

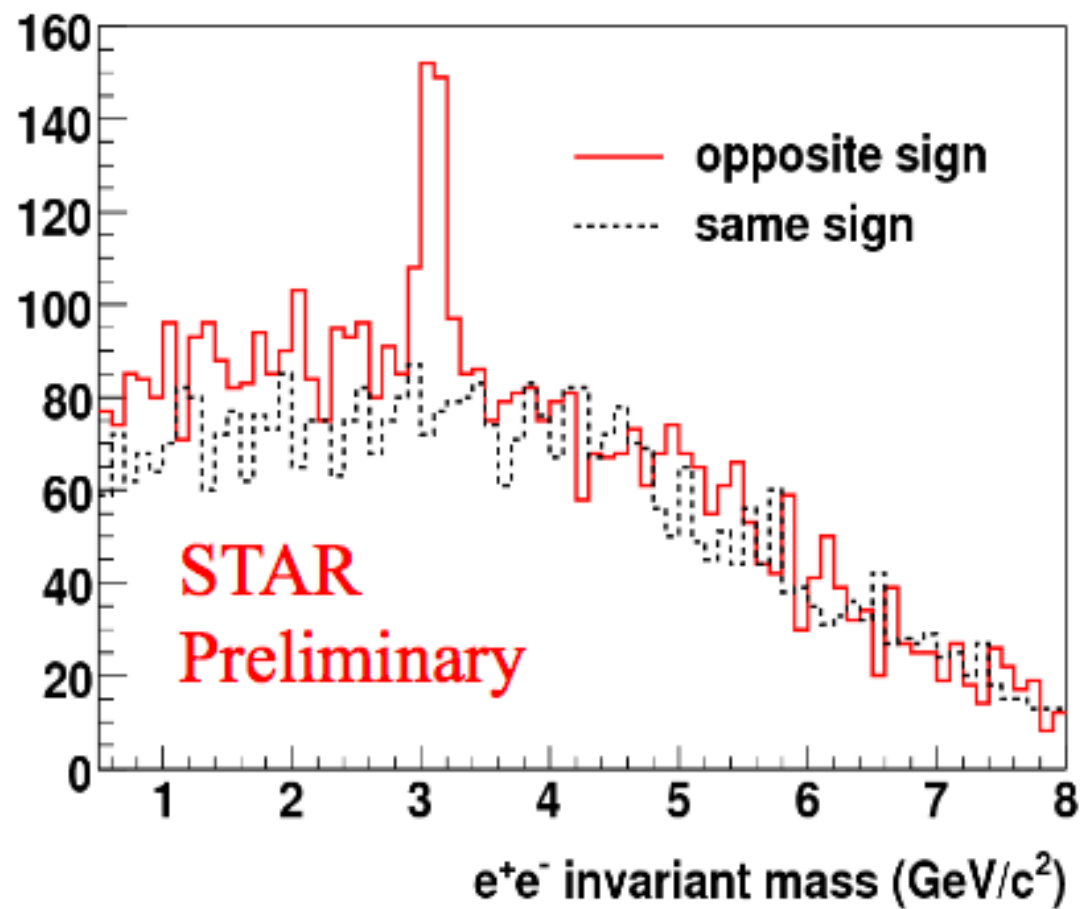
Tracking efficiency w.r.t. offline



p_T resolution



HLT J/ψ selection



Extending tracking to HFT

We extended the tracks from TPC to HFT by helix fit

To take the multiple Coulomb scattering into account, we set a search range when finding a appropriate HFT hit.

The single track pointing resolution for a two layer detector telescope has three terms

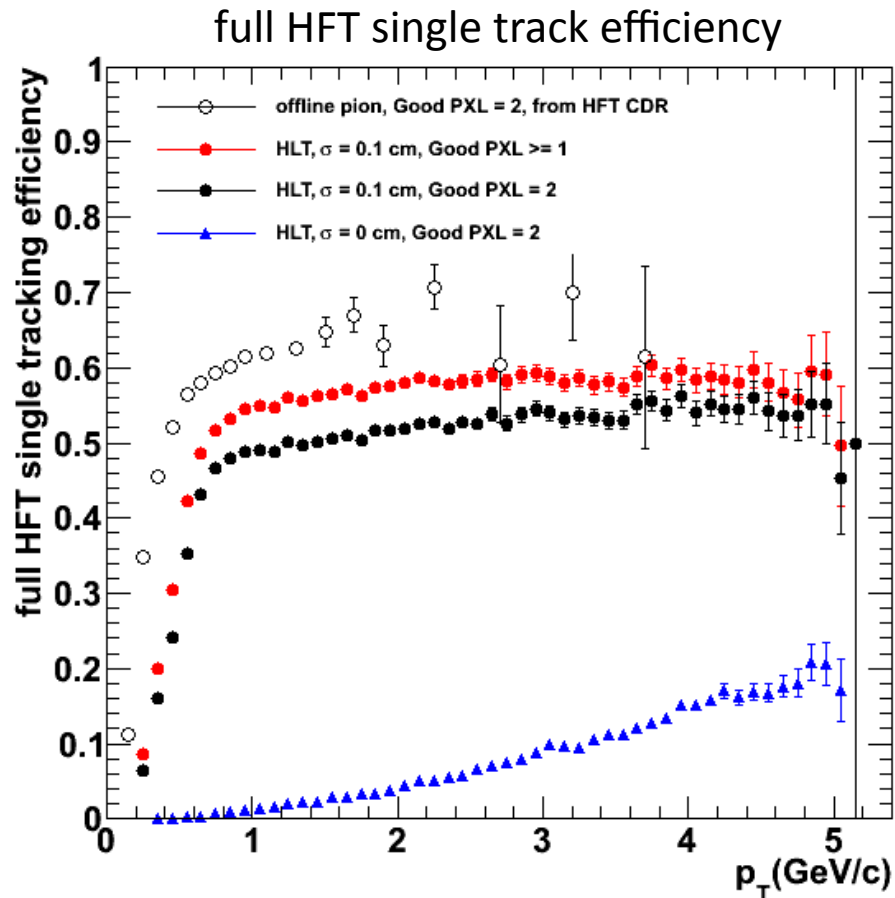
$$\sigma^2 = \frac{\sigma_1^2 r_2^2 + \sigma_2^2 r_1^2}{(r_2 - r_1)^2} + \frac{\theta_{mcs}^2 r_1^2}{\sin^2(\theta)}$$

$$\theta_{mcs} = \frac{13.6 (MeV/c)}{\beta p} \sqrt{\frac{x}{X_0}}$$

We need the values of $\sqrt{\frac{x}{X_0}}$ for each detector when calculate the search range.

Extending tracking to HFT

For a first time test, we just set a constant search range and tested two situations.



Data set	
Offline	pion embedding
HLT	$D_0 \rightarrow \pi^+ + K^-$ without the event background

✓ The single track efficiency is quite sensitive to the search range. We need a detailed description of multiple Coulomb scattering.

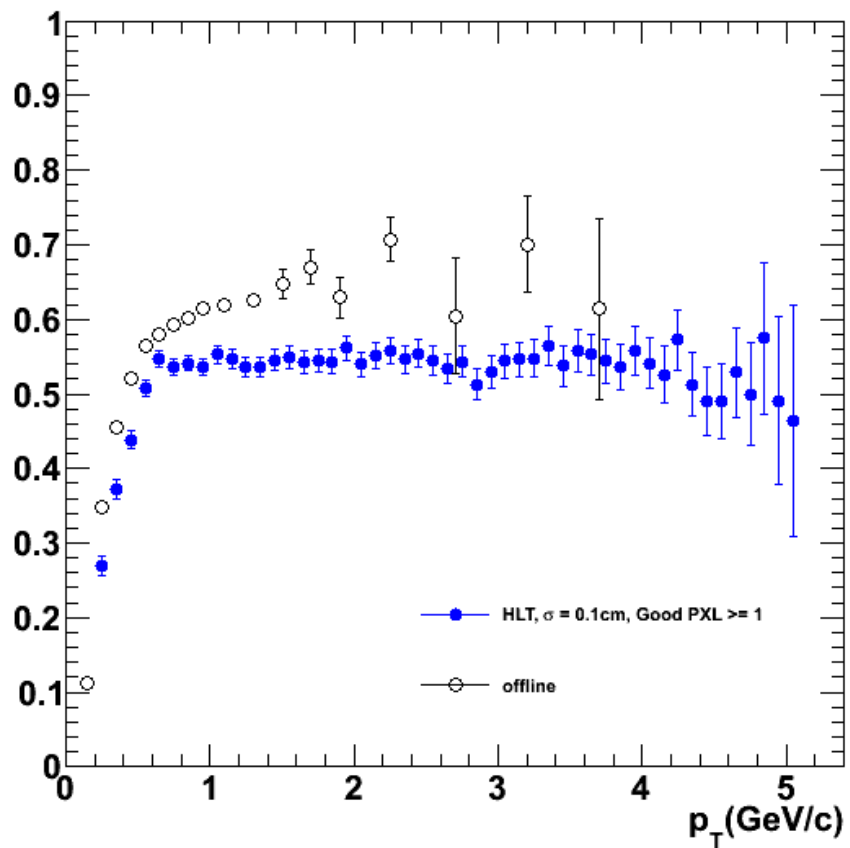
✓ We can increase the efficiency by extending the search range. This doable because the ghost will be controlled by TPC tracking.

Summary

- ✧ HLT tracker has a good tracking efficiency w.r.t. offline tracker
- ✧ In Run10, HLT has successfully triggered J/ψ events
- ✧ When extend to HFT, HLT tracker has a comparable single tracking efficiency to offline tracker, but a detailed multiple Coulomb scattering discretion is needed

THANK YOU!

backup



$D_0 \rightarrow \pi^+ + K^-$
embedded in pion events