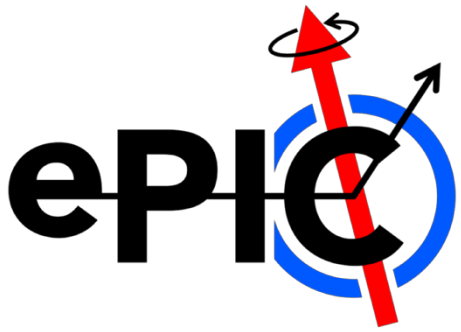
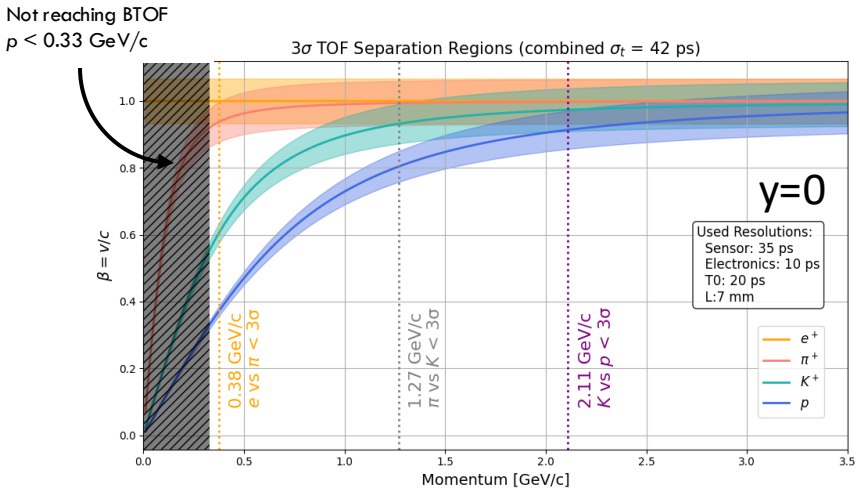


Barrel Time-of-Flight

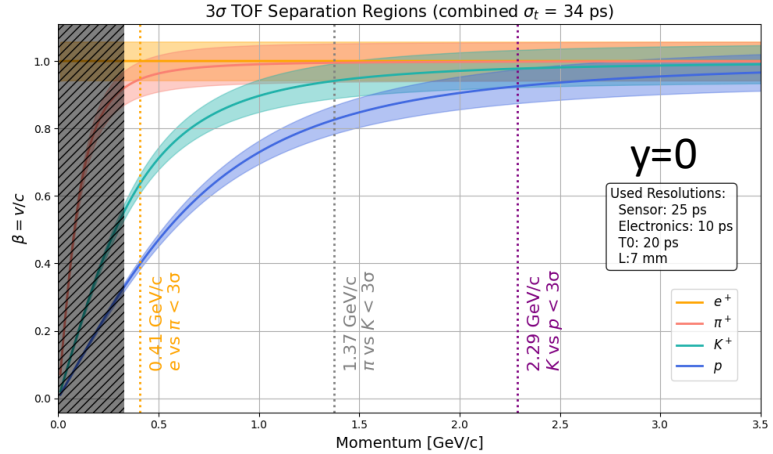
Satoshi YANO
(Hiroshima University)

Beta v.s. σ_{total} (y=0)

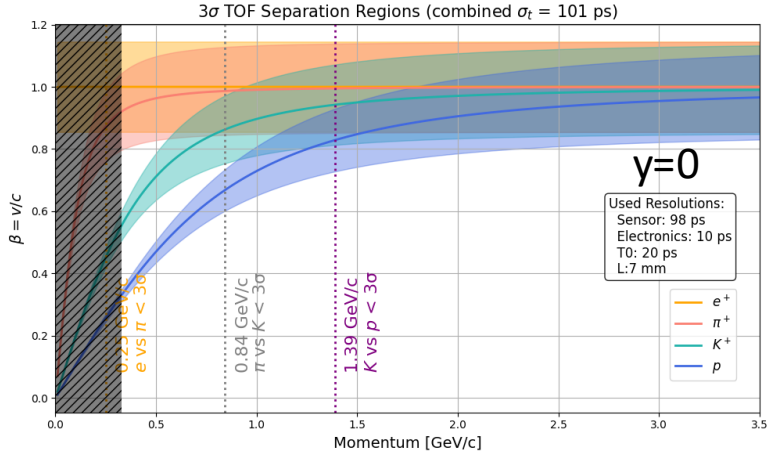
Default Case (σ_{sensor}=35ps)



Better Case (σ_{sensor}= 25ps)

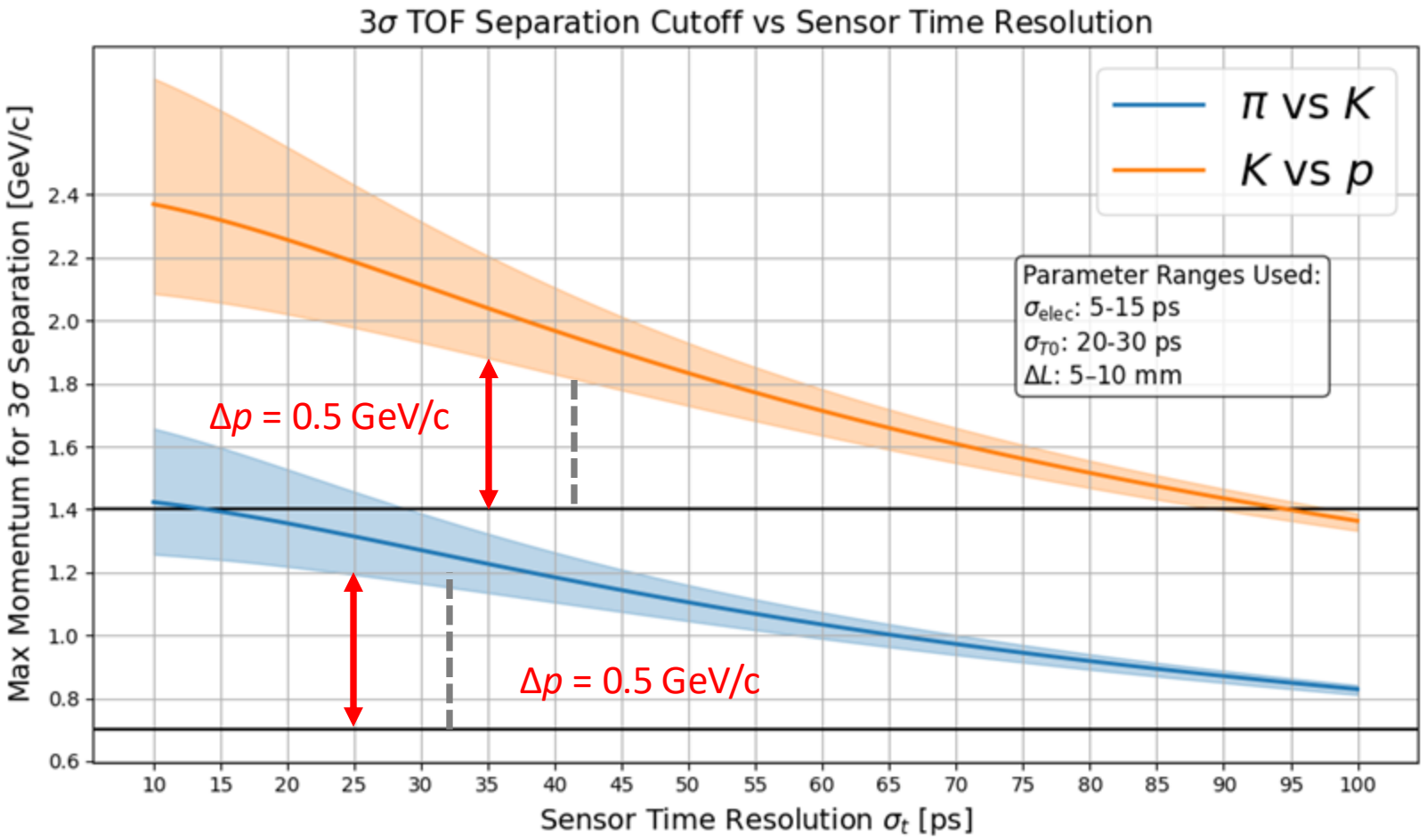


Worst Case (σ_{sensor}= 98ps)



- Some resolutions: σ_{ele} = 10 ps, σ_{T0} = ~~10~~ **20** ps and σ_L = 7 mm
- Default case: σ_{sensor} = 35 ps (σ_{total} = ~~38~~ **42** ps)
  - pion/kaon overlapping 0.7<p<~~1.32~~ **1.27** GeV/c, Kaon/proton overlapping 1.4<p<~~2.19~~ **2.11** GeV/c with hpDIRC
- Better case: σ_{sensor} = 25 ps (σ_{total} = ~~29~~ **34** ps)
  - pion/kaon overlapping 0.7<p<~~1.44~~ **1.37** GeV/c, Kaon/proton overlapping 1.4<p<~~2.41~~ **2.29** GeV/c with hpDIRC
- Worst case: σ_{sensor} = ~~100~~ **98** ps (σ_{total} = 101 ps)
  - pion/kaon overlapping 0.7<p<0.84 GeV/c, NO overlapping for Kaon/proton separation with hpDIRC

3σ separation v.s. σ_{sensor}



← hpDIRC limit for K/p sep.

← hpDIRC limit for π/K sep.

Considering the worst case (σ_{elec}=15ps, σ_{T0}=30ps, ΔL=10mm),

~~32~~ **25** ps sensor timing resolution is required to be 0.5 GeV/c overlapping for π/K separation

Track length uncertainty effect