ITK&OTK ToF & TPC PID combination study

Dian yu,Houqian Ding
YunYun Fan
Yongfeng Zhu
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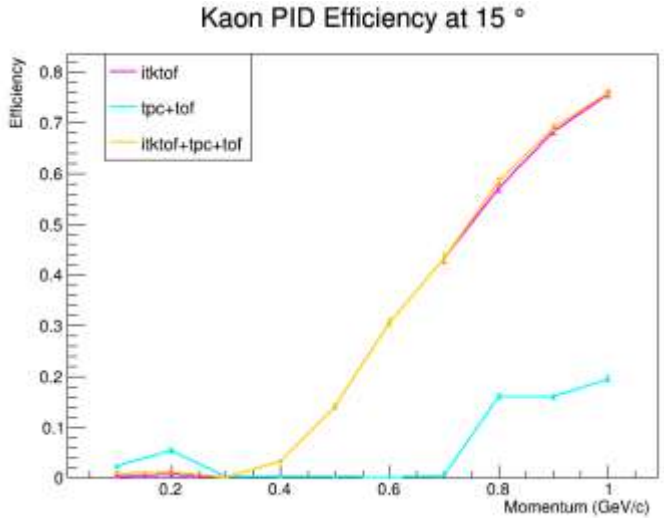
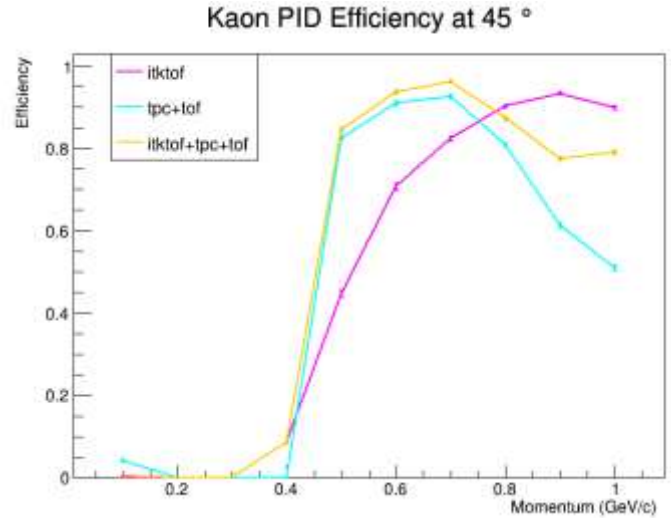
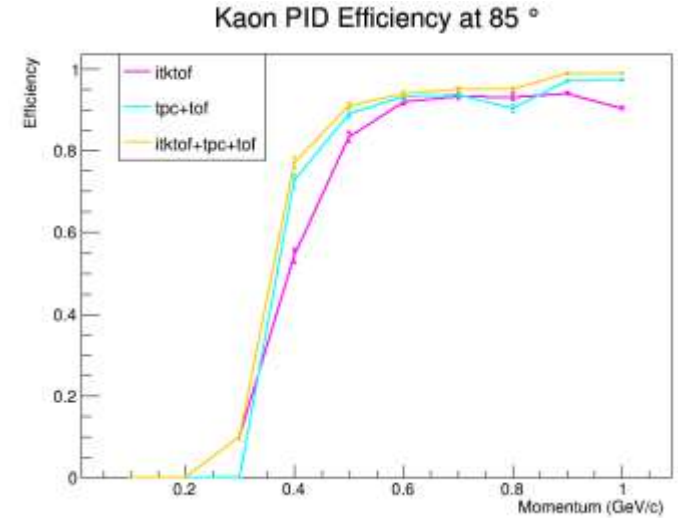
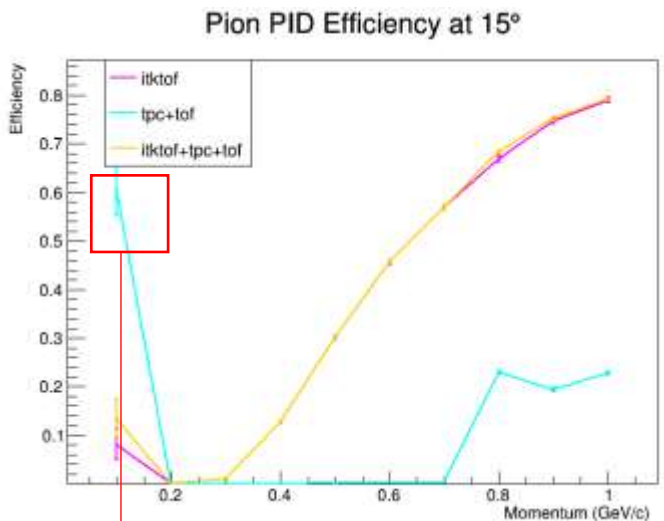
K PID efficiency on (0-1)GeV/c at 15°，45°，85°

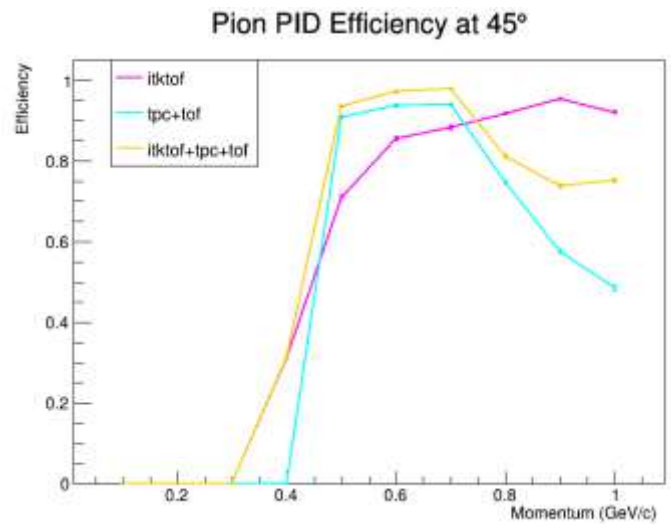


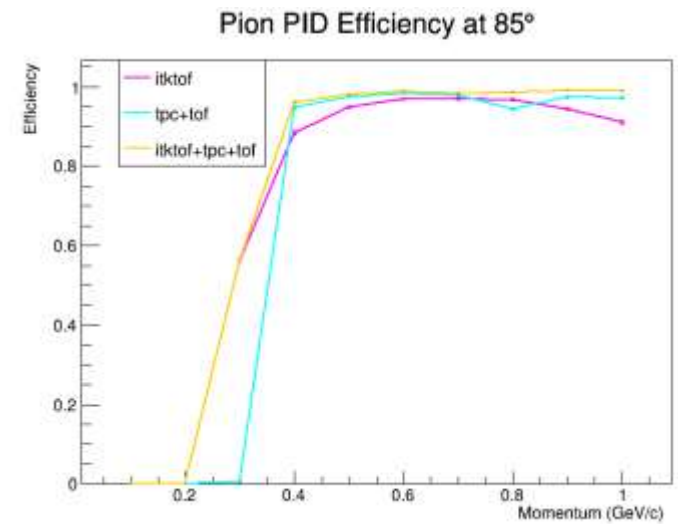




pi PID efficiency on (0-1)GeV/c at 15°，45°，85°





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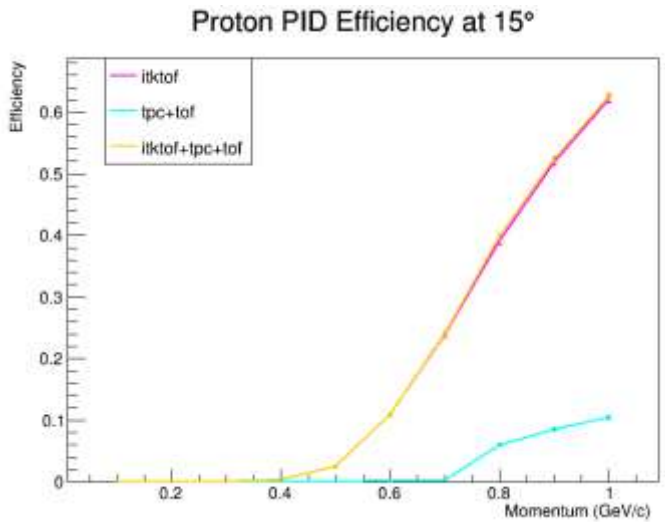
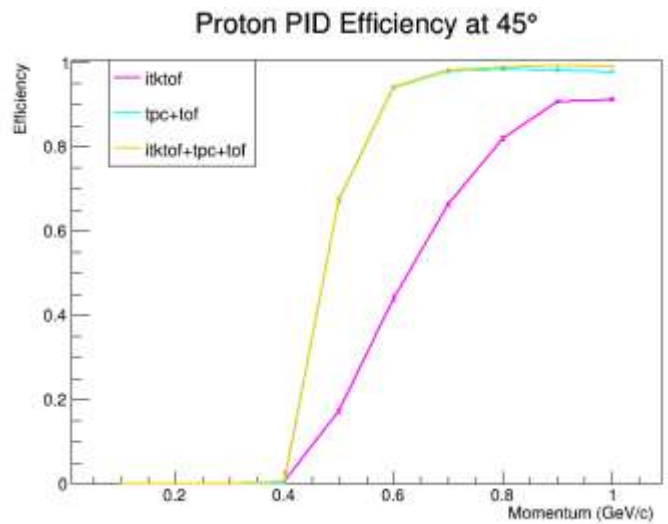
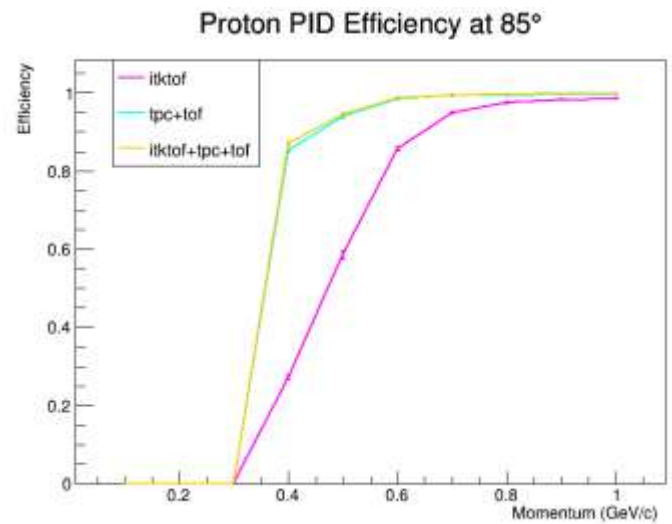
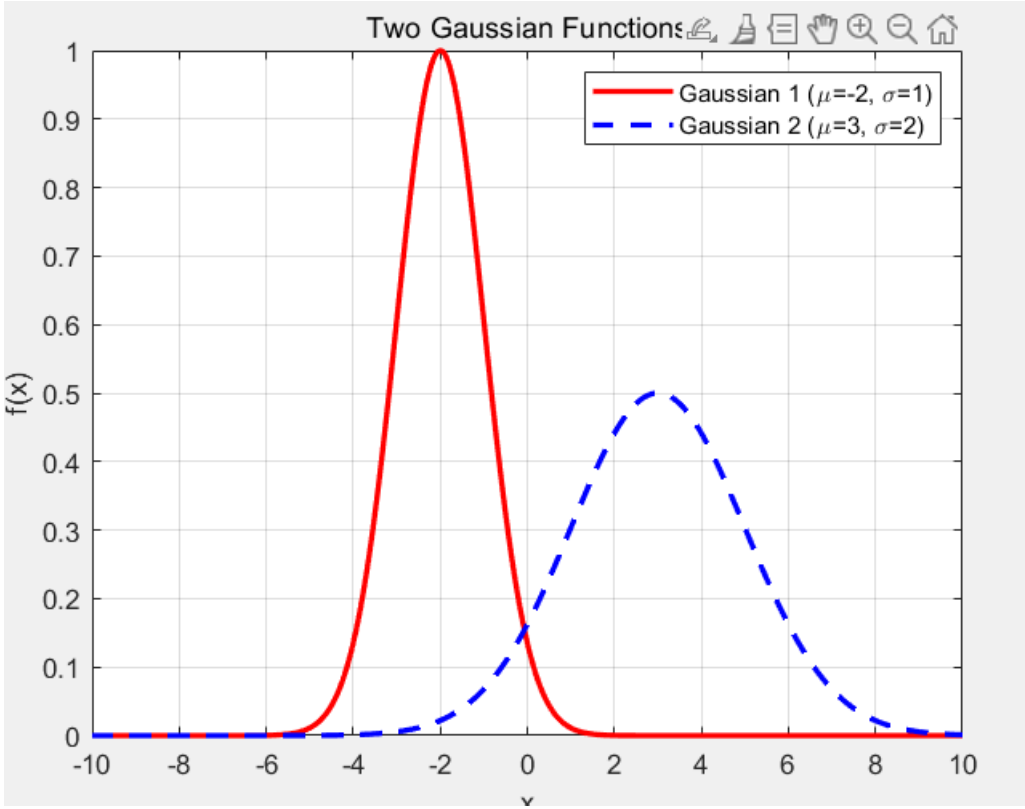
P PID efficiency on (0-1)GeV/c at 15°，45°，85°









$$\chi_a = \frac{|x-\mu_a|}{\sigma_a}, \chi_b = \frac{|x-\mu_b|}{\sigma_b}$$

$$x = X, make \chi_a = \chi_b$$

$$\frac{|X-\mu_a|}{\sigma_a} = \frac{|X-\mu_b|}{\sigma_b}$$

$$X = \frac{\sigma_a * \mu_b + \sigma_b * \mu_a}{\sigma_a + \sigma_b}$$

$$\frac{|X-\mu_a|}{\sigma_a} = \frac{|X-\mu_b|}{\sigma_b} = \frac{|\mu_a-\mu_b|}{\sigma_a+\sigma_b}$$

Def: S= $\frac{|\mu_a-\mu_b|}{\sigma_a+\sigma_b}$

separation power ~S*σ distribution
Efficiency~erf(s*σ/sqrt (2))

The figure of merit which has to be optimized is not the resolution but the particle separation power between two particle species A and B defined as:

$$\text{separation power} = \frac{\text{separation}}{\text{resolution}} = \frac{dE/dx(A) - dE/dx(B)}{\sigma(dE/dx)_{A,B}}, \quad (5)$$

where $\sigma(dE/dx)_{A,B}$ is the average dE/dx resolution for the two particle species.