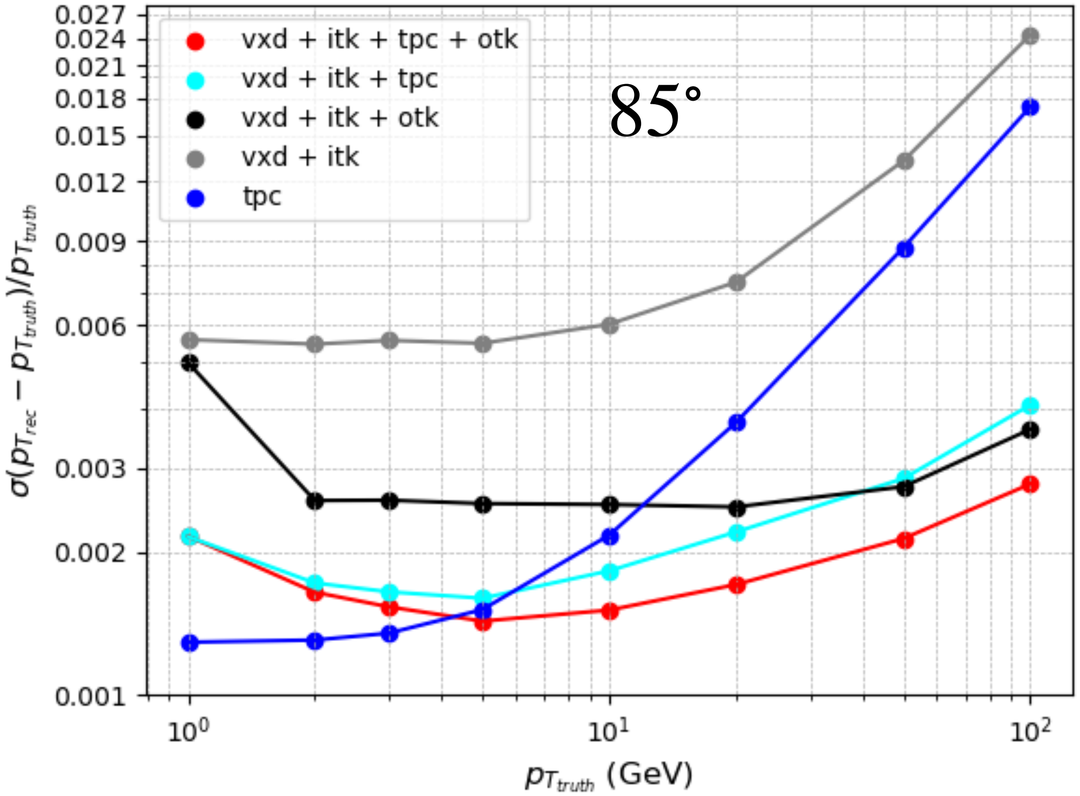
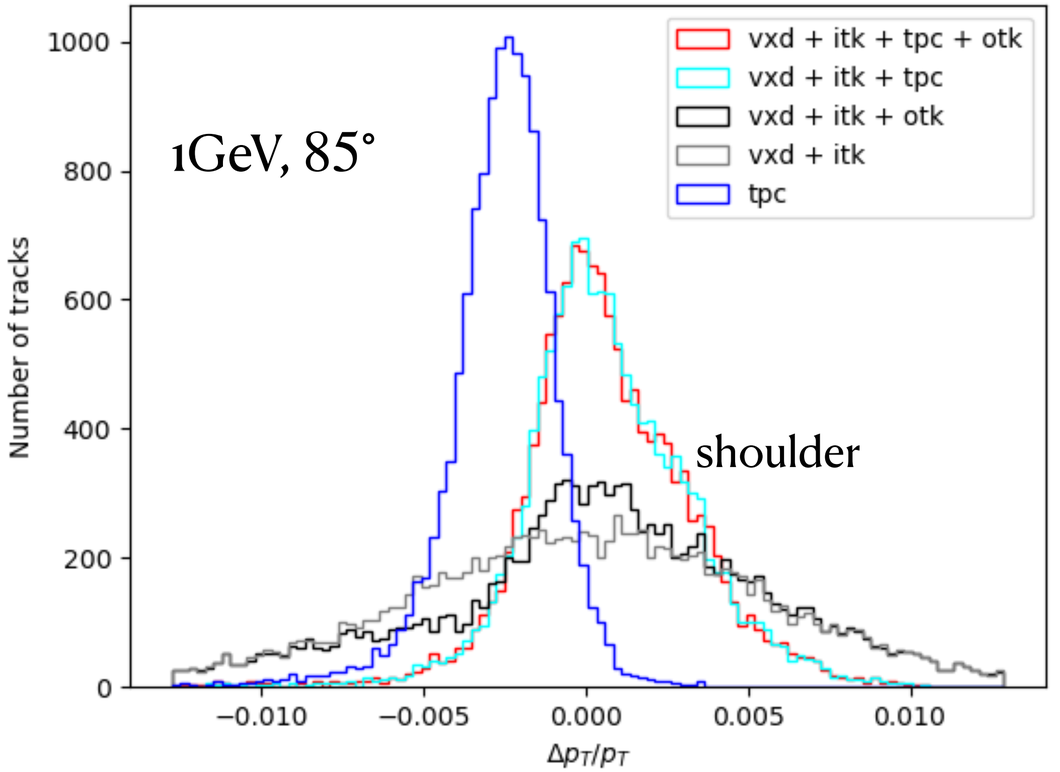
Tracking & PID

C.Zhang/18Nov2024

Tracking



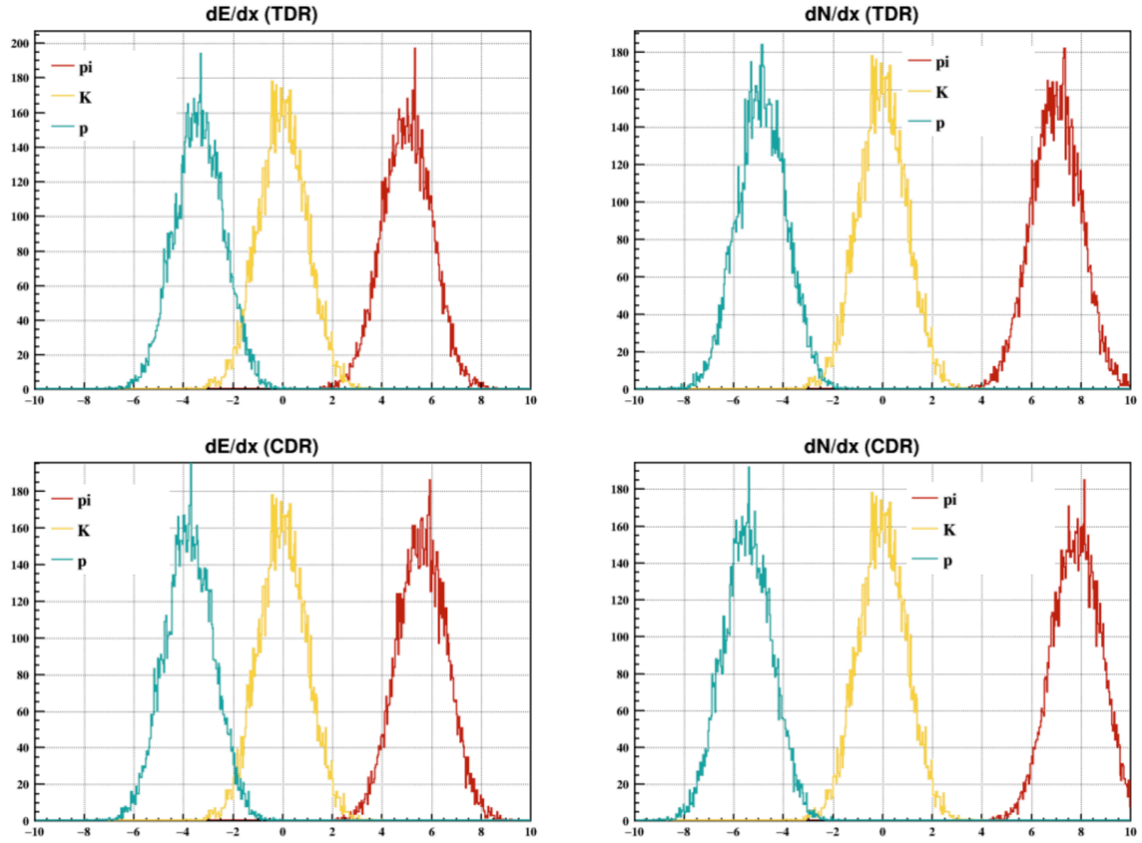


- Performance in low pT range
  - Software group gives replies, thinking the issue is being caused by the shoulder on $\frac{\delta p_T}{pT}$ distributions. Working on that
- Sensor resolutions configured in SW will be synchronised with hardware group

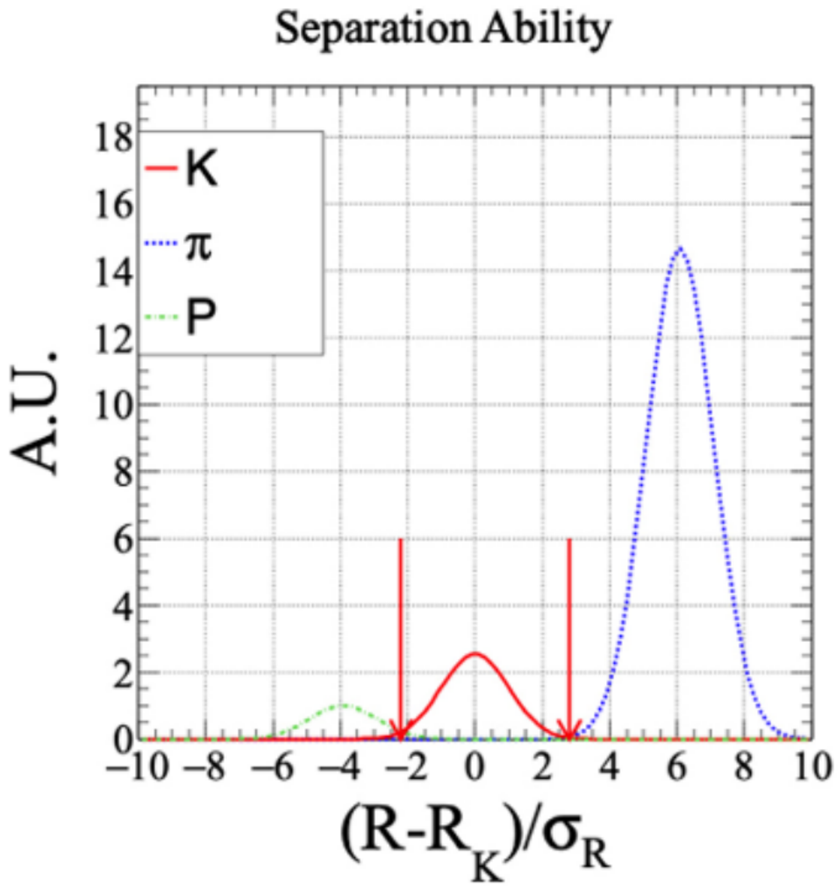
from Jinxian Zhang

PID

MC Truth @ 12GeV, cos θ = 0.3



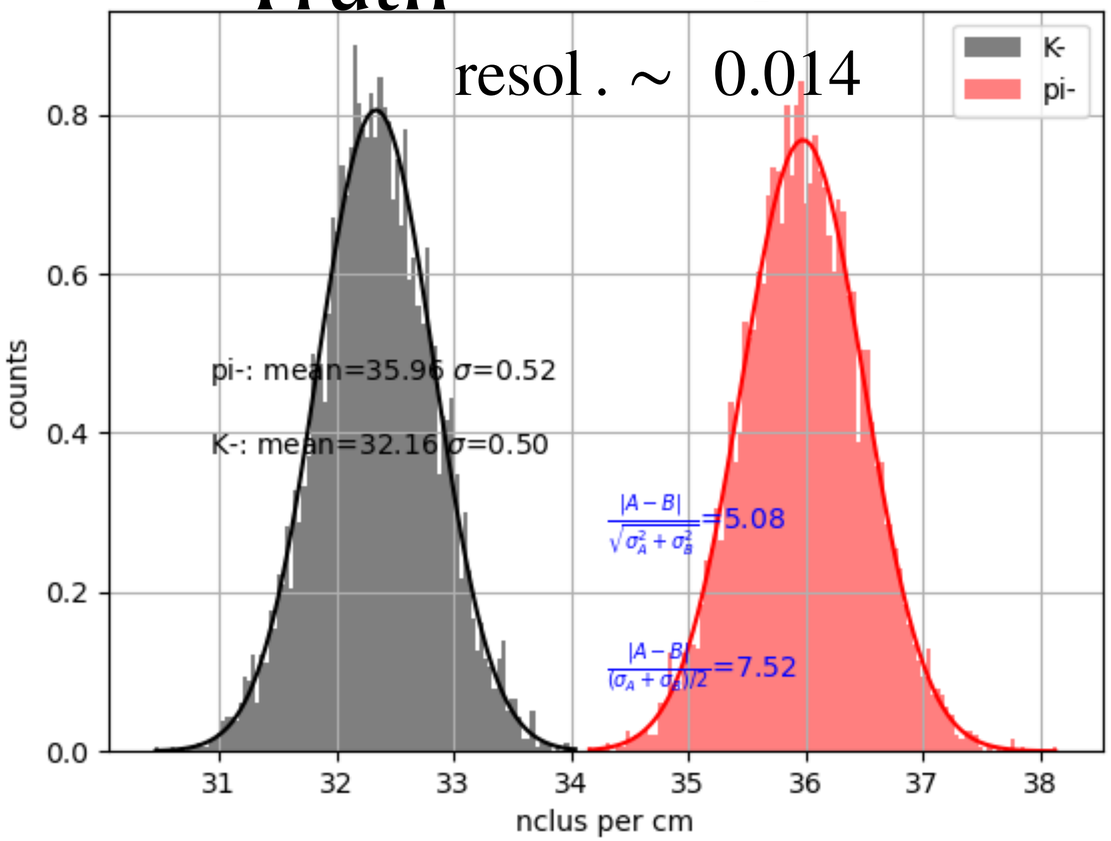
Garfield++模拟。左侧：dE/dx结果；右侧：dN/dx结果



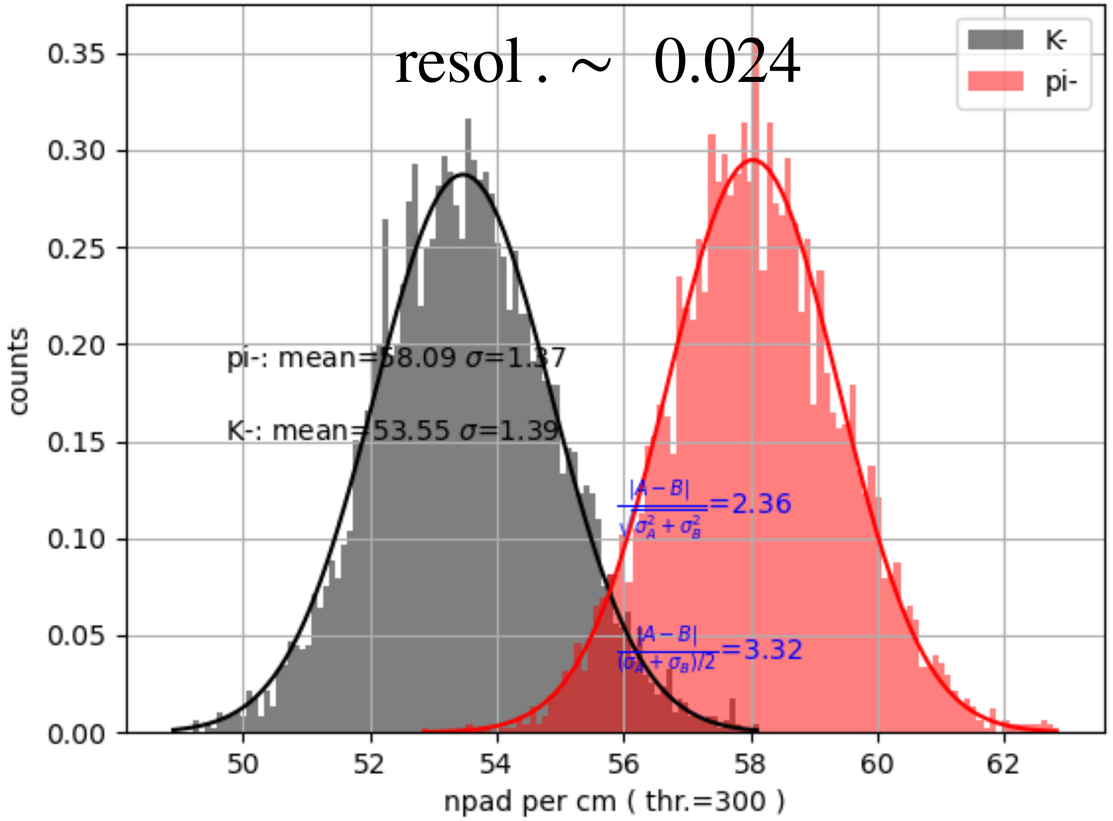
- Similar @ truth level, **No large difference between CDR and TDR**

PID

Truth $\cos\theta = 0.3$,p = 12GeV



Rec $\cos\theta = 0.3$,p = 12GeV

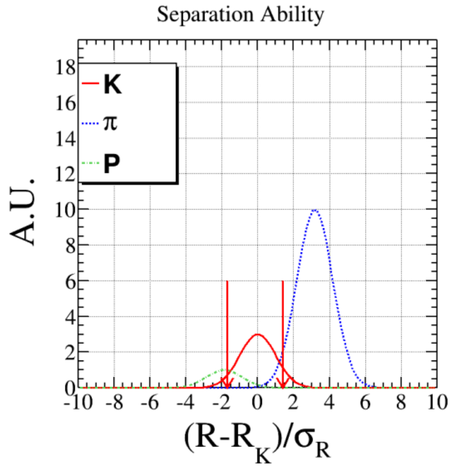


- $\dfrac{\sigma_{Rec}/\mu_{Rec}}{\sigma_{Truth}/\mu_{Truth}} - 1 \sim 0.7$

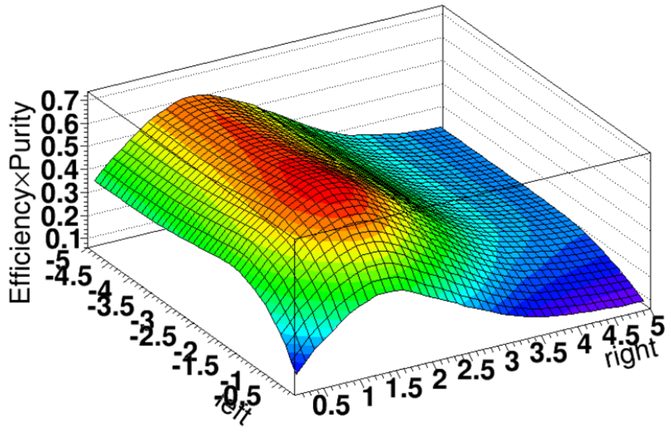
from Xiatian Ma

PID

Optimal cut with maximum efficiency times purity



Ideal weighted $\chi_{TPC}(i \to K)$ distribution



cut optimization

- "Cut-optimisation" better than "minimum χ^2" 10% in Eff. x Purity
- Only for a single point $\cos\theta = 0.3$,p = 12GeV, working on global performance

❖ Cut optimization at $(\cos\theta, p) = (0.3, 12\text{GeV})$

- Maximize efficiency times purity for $\chi_{TPC}(i \to K)$ distribution to select K
- R is $(dN/dx)_{\text{meas}}$, R_K is $(dN/dx)^K_{\text{exp}}$, σ is $\sigma_{(dN/dx)_{\text{meas}}}$, π: K: p = (10: 3: 1)
- Maximum point at $-1.7 < \chi_{TPC}(K) < 1.4$, corresponding K efficiency is 0.874, K purity is 0.775, K efficiency improves a lot (+0.11), K purity improves a little (+0.01)
- If we choose the minimum χ^2 to select K, K efficiency is 0.765, K purity is 0.765

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Table 3
The $K^{\pm}$ identification performance with different factors, $\sigma_{actual} = factor \cdot \sigma_{intrinsic}$, with/without combination of TOF information at the Z-pole.

	Factor	1.	1.2	1.5	2.
dE/dx	ε_K (%)	95.97	94.09	91.19	87.09
	$purity_K$ (%)	81.56	78.17	71.85	61.28
dE/dx & TOF	ε_K (%)	98.43	97.41	95.52	92.3
	$purity_K$ (%)	97.89	96.31	93.25	87.33

back up