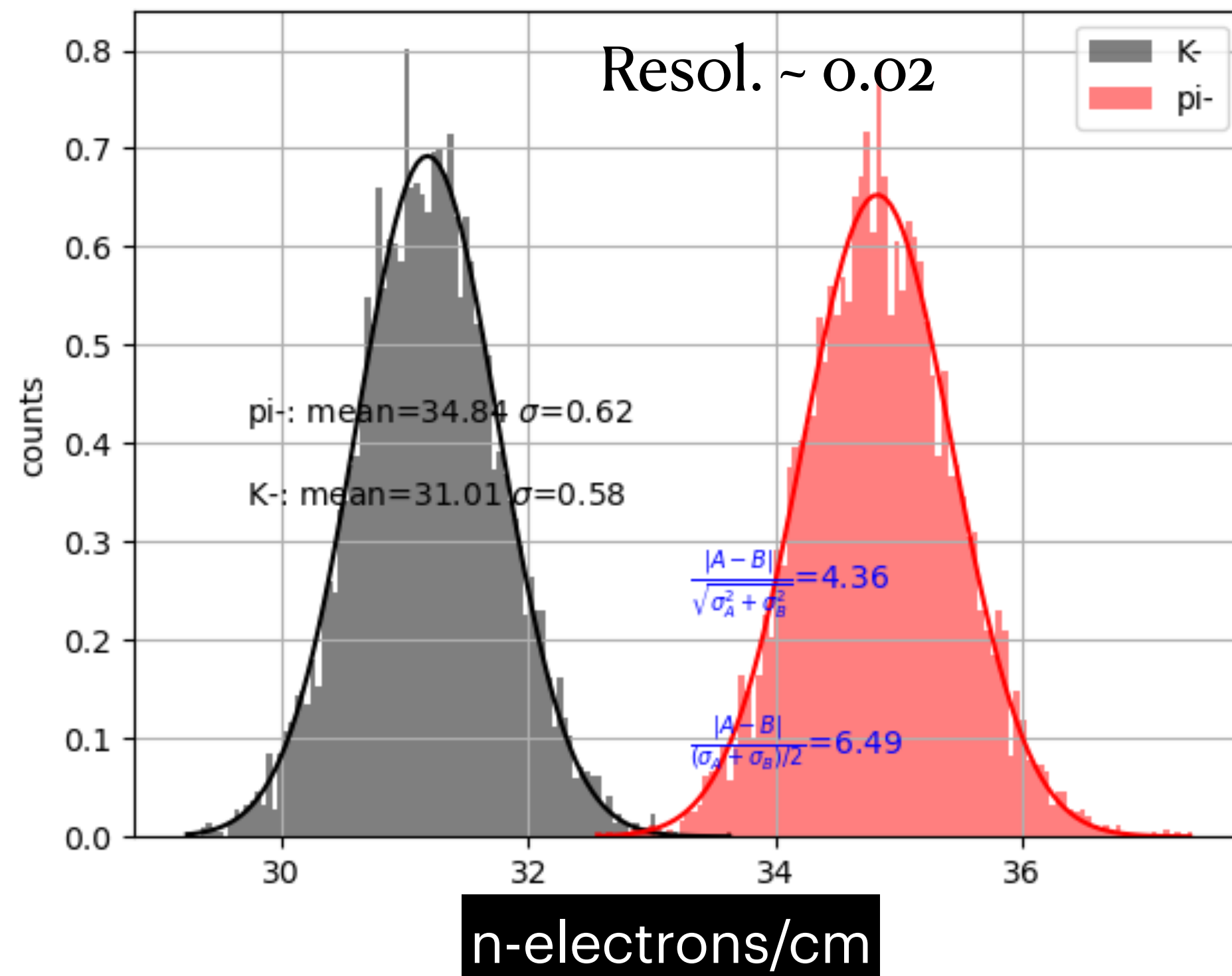


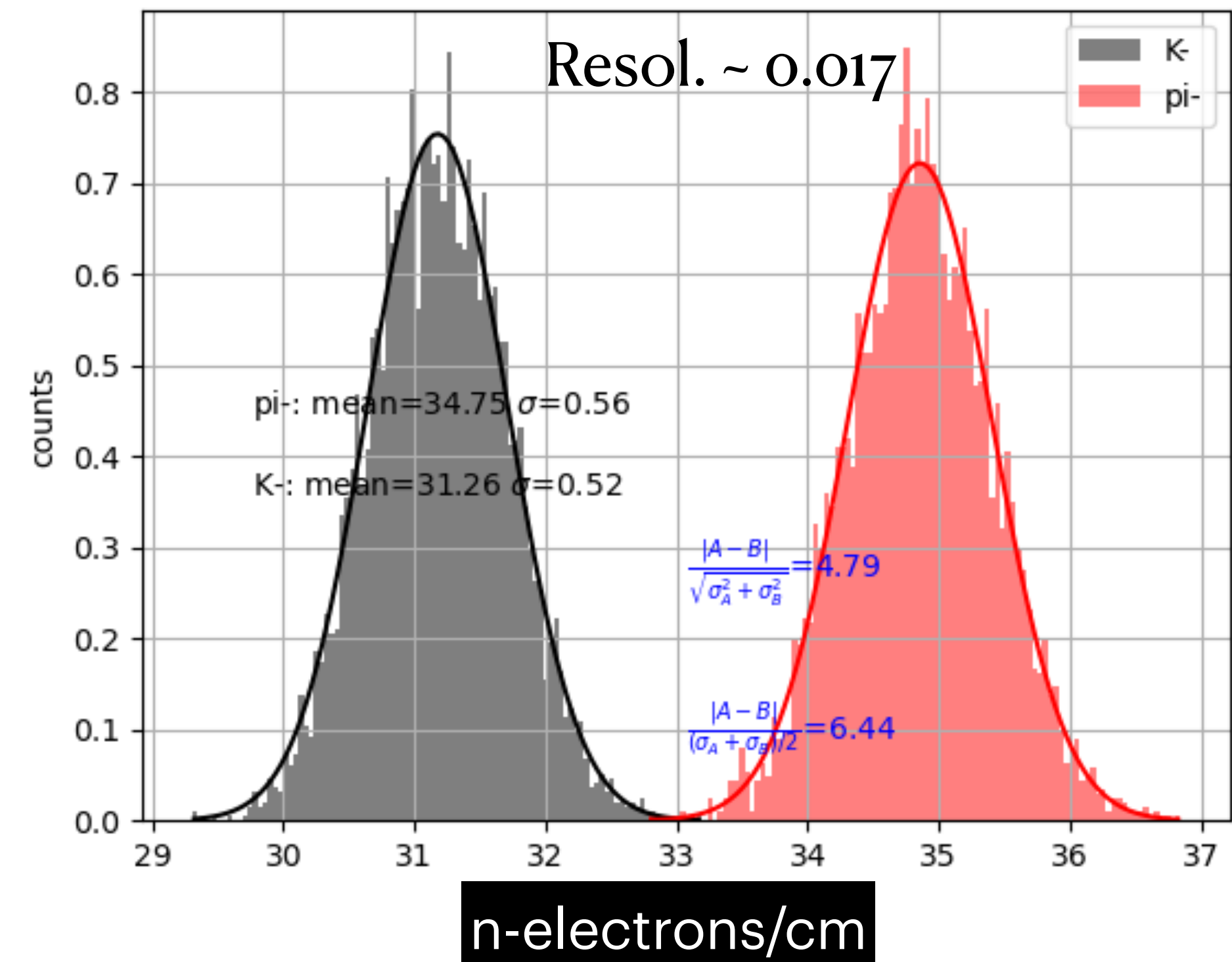
Garfield stand-alone dE/dx PID

C.Zhang/15Nov2024

Truth dE/dx K/pi separation

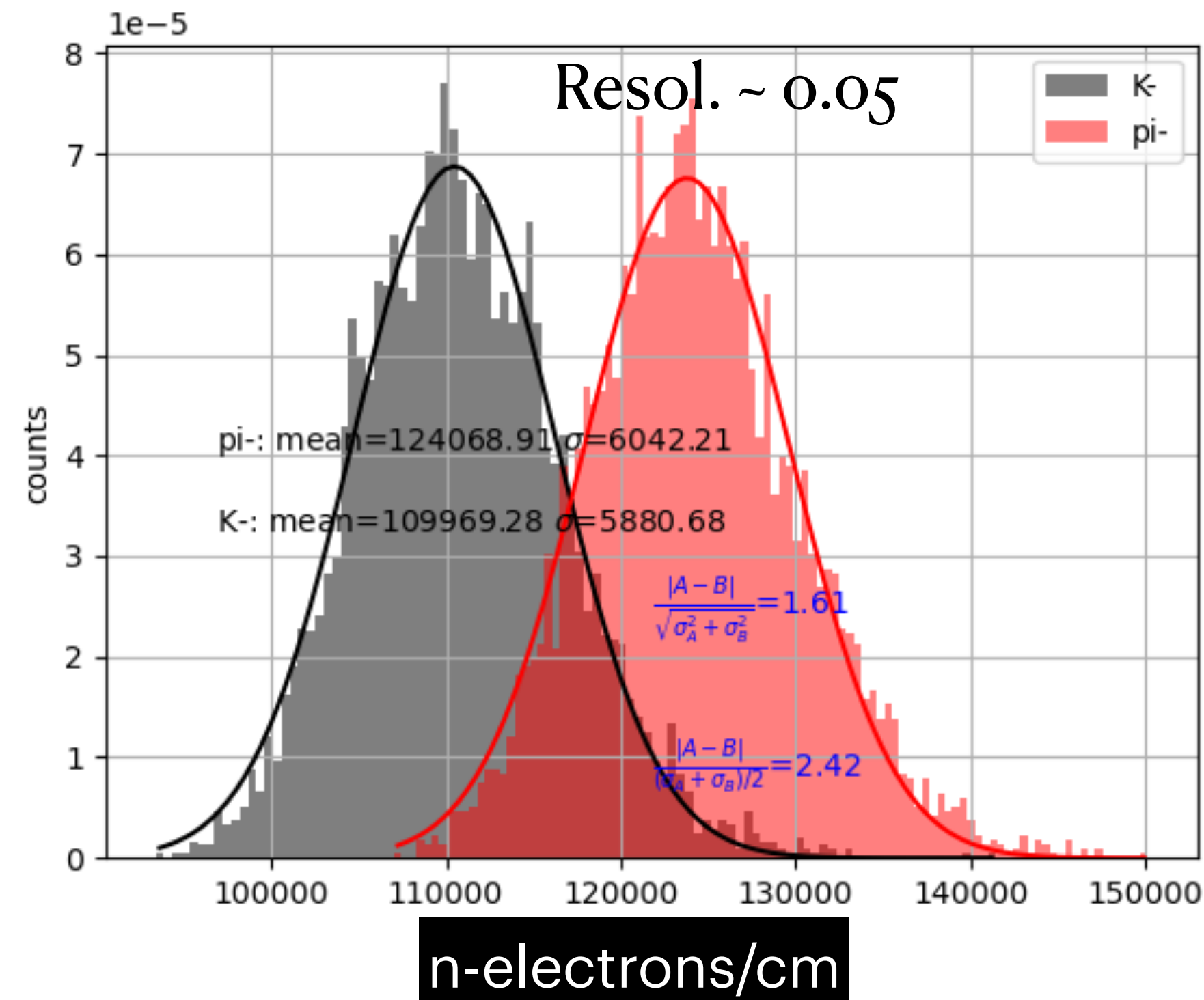


- innerR=60, outerR=180 cm
- L/2 = 290 cm
- pad size = 0.5 mm x 0.5 mm
- B = 2 T
- Ar 95%, C₄H₁₀ 2%, CF₄ 3%
- 90% truncation ratio

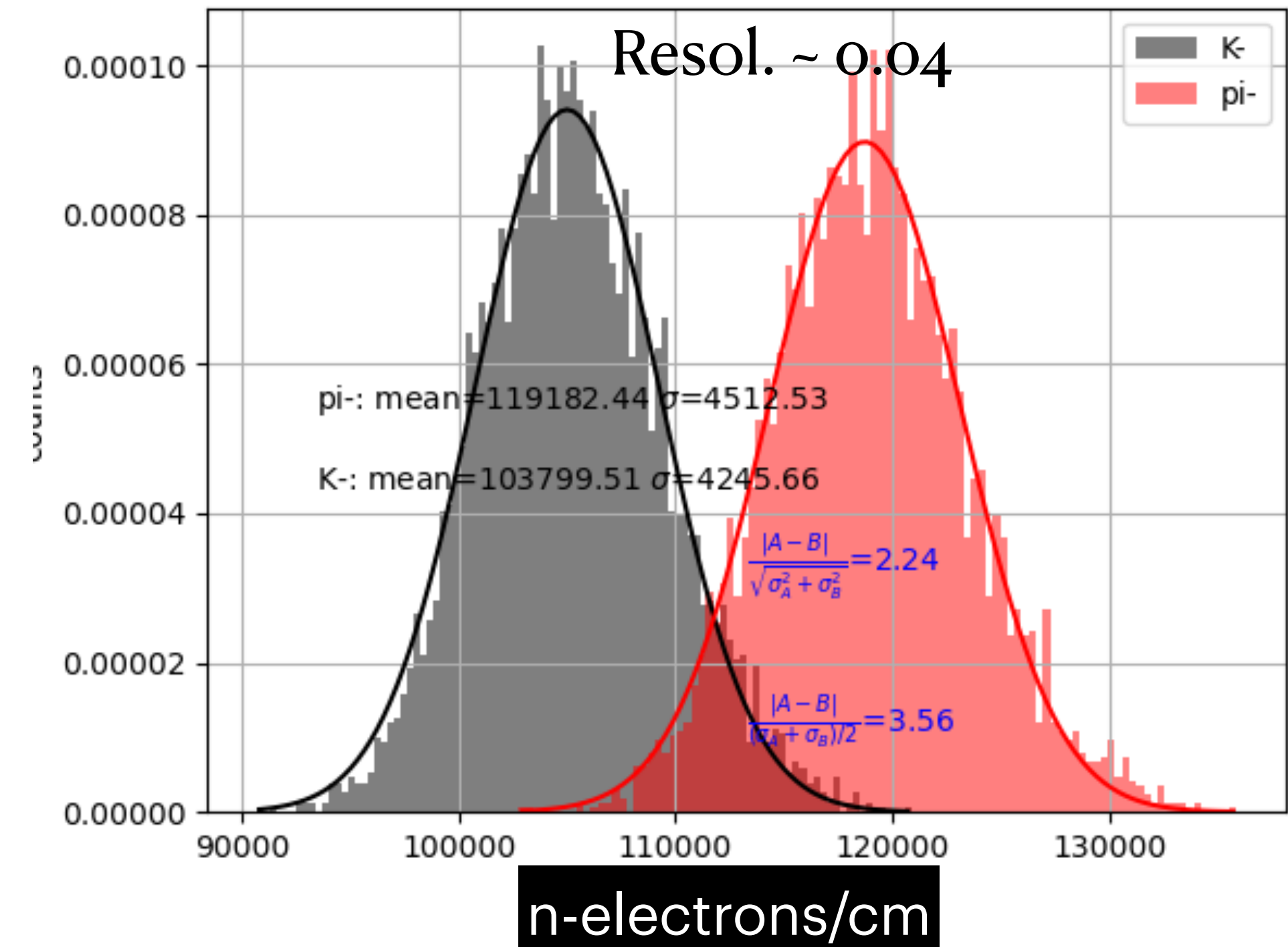


- innerR=30, outerR=180 cm
- L/2 = 230 cm
- pad size = 1 mm x 6 mm
- B = 3 T
- Ar 95%, C₄H₁₀ 2%, CF₄ 3%
- 90% truncation ratio

Rec. dE/dx K/pi separation



- innerR=60, outerR=180 cm
- L/2 = 290 cm
- pad size = 0.5 mm x 0.5 mm
- B = 2 T
- Ar 95%, C₄H₁₀ 2%, CF₄ 3%
- 90% truncation ratio



- innerR=30, outerR=180 cm
- L/2 = 230 cm
- pad size = 1 mm x 6 mm
- B = 3 T
- Ar 95%, C₄H₁₀ 2%, CF₄ 3%
- 90% truncation ratio

Table 1 Properties of TPCs in previous experiments. Comparison of the relative dE/dx resolution between MC and experimental measurements

Experiment	PEP-4 [19–21]	TOPAZ [22,23]	DELPHI [24–26]	ALEPH [4,27]	STAR [28,29]	ALICE [5,30]	CEPC
Start of data taking	1982	1987	1989	1989	2000	2009	–
Colliding Particles	e^-/e^+	e^-/e^+	e^-/e^+	e^-/e^+	Au/Au	p/p	e^-/e^+
E_{beam} (GeV)	14.5	26	45.6	45.6	100	1380	125
Gas	Ar: 0.8 CH ₄ : 0.2	Ar: 0.9 CH ₄ : 0.1	Ar: 0.8 CH ₄ : 0.2	Ar: 0.91 CH ₄ : 0.09	Ar: 0.9 CH ₄ : 0.1	Ne: 0.857 CO ₂ : 0.095 N ₂ : 0.048	Ar: 0.93 CH ₄ : 0.05 CO ₂ : 0.02
Pressure (atm)	8.5	3.5	1	1	1	1	1
ρ (mg/ml)	12.43	5.47	1.46	1.57	1.56	0.95	1.73
n	183	175	192	344	13, 32 ^c	63, 64, 32 ^c	222
h (mm)	4	4	4	4	12, 20 ^c	7.5, 10, 15 ^c	6
Length (mm)	2000	3000	2680	4400	4200	5000	4700
Control Sample	e	π	π	e	π	π	K
p (GeV/c)	14.5	0.4–0.6	0.4–0.6	45.6	0.4–0.6	6.0	5.0
Truncation range	0–65%	0–65%	8–80%	8–60%	0–70%	0–60%	0–90%
N_{eff}	n	$0.7n^{\text{a}}$	$0.6n^{\text{b}}$	338	44	149	n
$(\sigma_I/I)_{\text{MC}}$	2.6%	3.8%	5.4%	3.0%	5.3%	3.3%	3.1%
$(\sigma_I/I)_{\text{exp}}$	3.5%	4.6%	6.2%	4.4%	6.8% ^d	5.0%	–
$\left \frac{(\sigma_I/I)_{\text{exp}}}{(\sigma_I/I)_{\text{MC}}} - 1 \right $	0.35	0.21	0.15	0.47	0.28	0.52	–