ML 2025

By Mohhamed Rafi

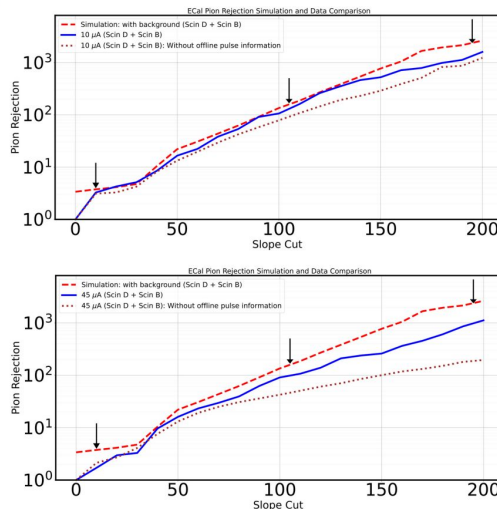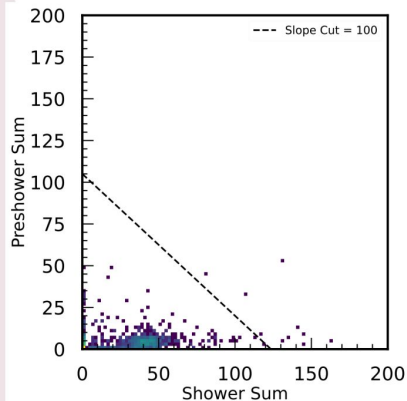# ML/Classical First Look

Classical Cuts

PID Performance

Charged Pion Samples: TS2 events with:

- CerSum<100
- SC-C>500
- LASPD-T(B)>10

A "slope cut" is then applied to study pion rejection of ECal

- Arrows in the figure correspond to a 95% electron efficiency for electrons in ranges of (0-1], (1-2], and (2-3] GeV, as determined by simulation

- The three curves are: simulation, data with waveform "cleaning", and data without waveform "cleaning"

ML-PID Model

Electron Efficiency and Pion Rejection Table (for p values in (0, 1)] GeV)

Bkg Sampling Ratio	Electron Efficiency	$\pi^{\pm}$ Rejection	π^0 Rejection
3	0.981	1435.4533	1.9891
13	0.9559	406.8513	2.0262

Electron Efficiency and Pion Rejection Table (for p values in (1, 2)] GeV)

Bkg Sampling Ratio	Electron Efficiency	$\pi^{\pm}$ Rejection	π^0 Rejection
3	0.9824	756.2336	2.1737
13	0.9727	187.9972	2.242

Electron Efficiency and Pion Rejection Table (for p values in (2, 3)] GeV)

Bkg Sampling Ratio	Electron Efficiency	$\pi^{\pm}$ Rejection	π^0 Rejection
3	0.9883	inf	2.0908
13	0.988	187.8234	2.187

Higher Momentum Events

Higher Momentum Events (No TS2 Cuts)
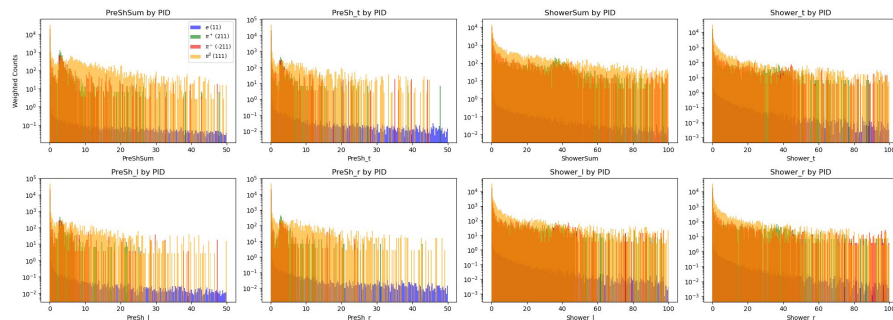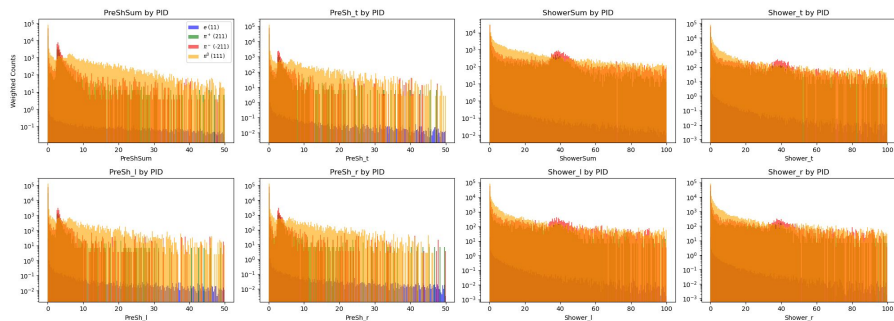

No cuts, p in [0, 1) GeV, total # events: 838274
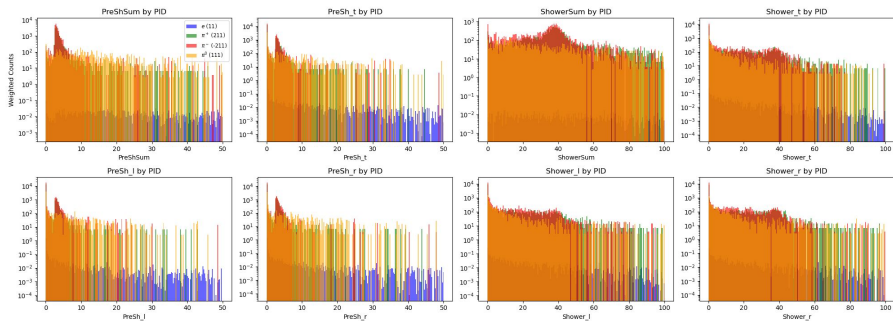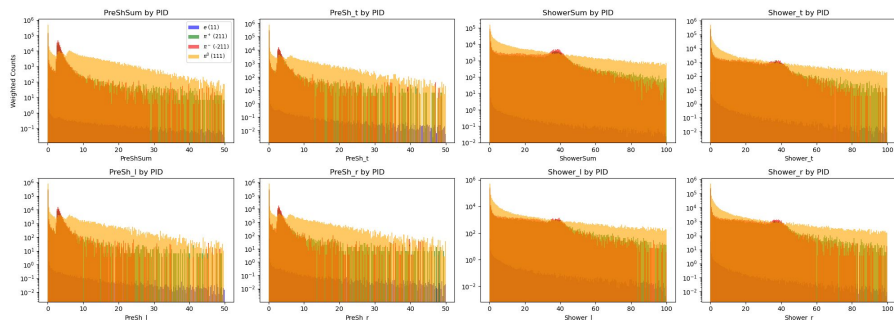
No cuts, p in [3, 4) GeV, total # events: 184853

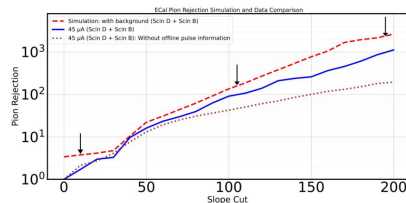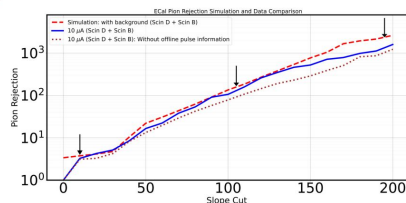No cuts, p in [2, 3) GeV, total # events: 263925

Rejection/Efficiency Trends
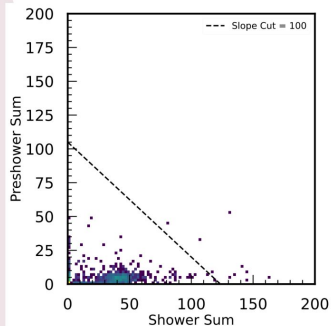
Classical Cuts

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