

- ▶ <https://github.com/Meatbally2/snippets/tree/main/ElectronID> or <https://github.com/eic/snippets/tree/main/ElectronID>

README

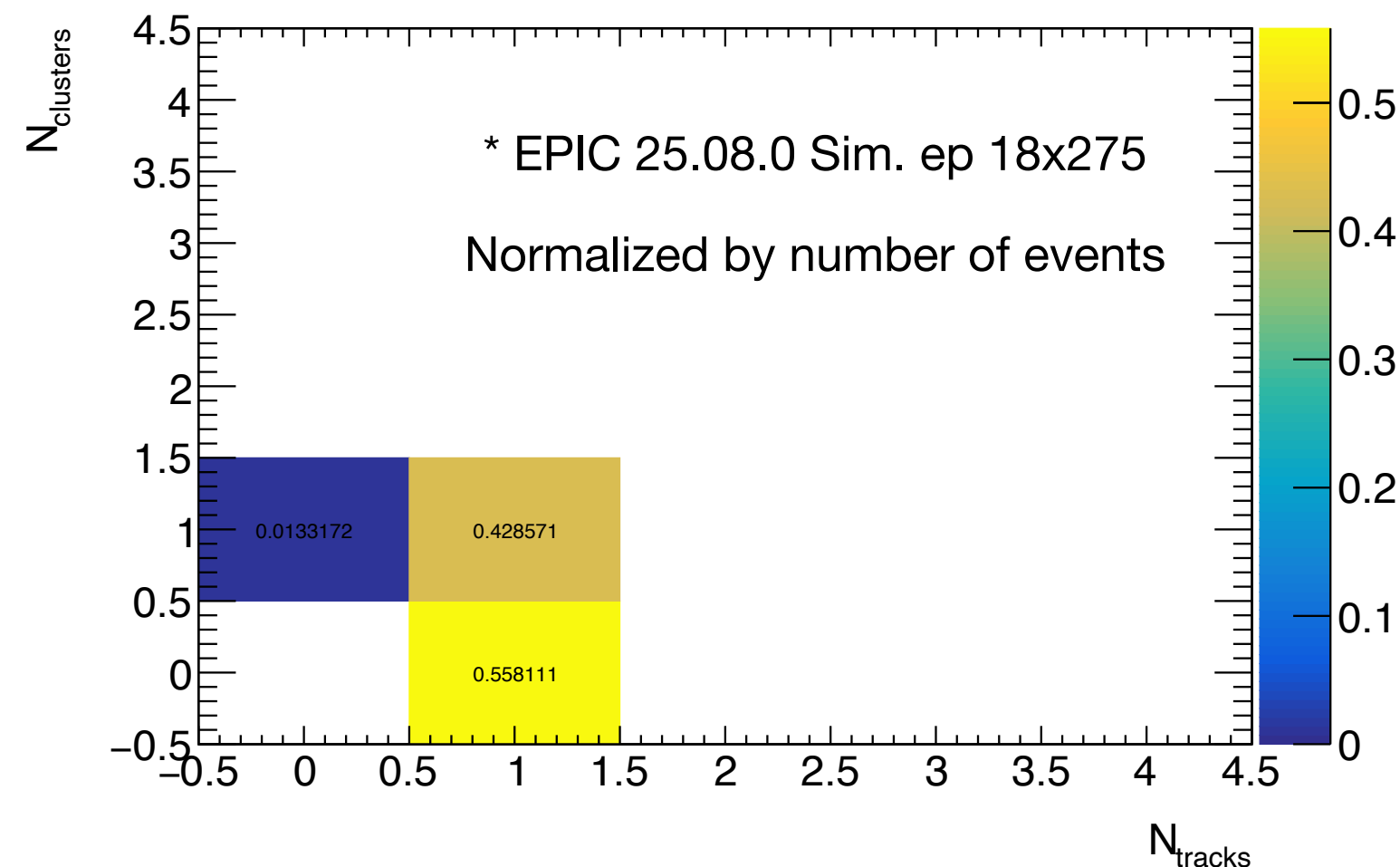
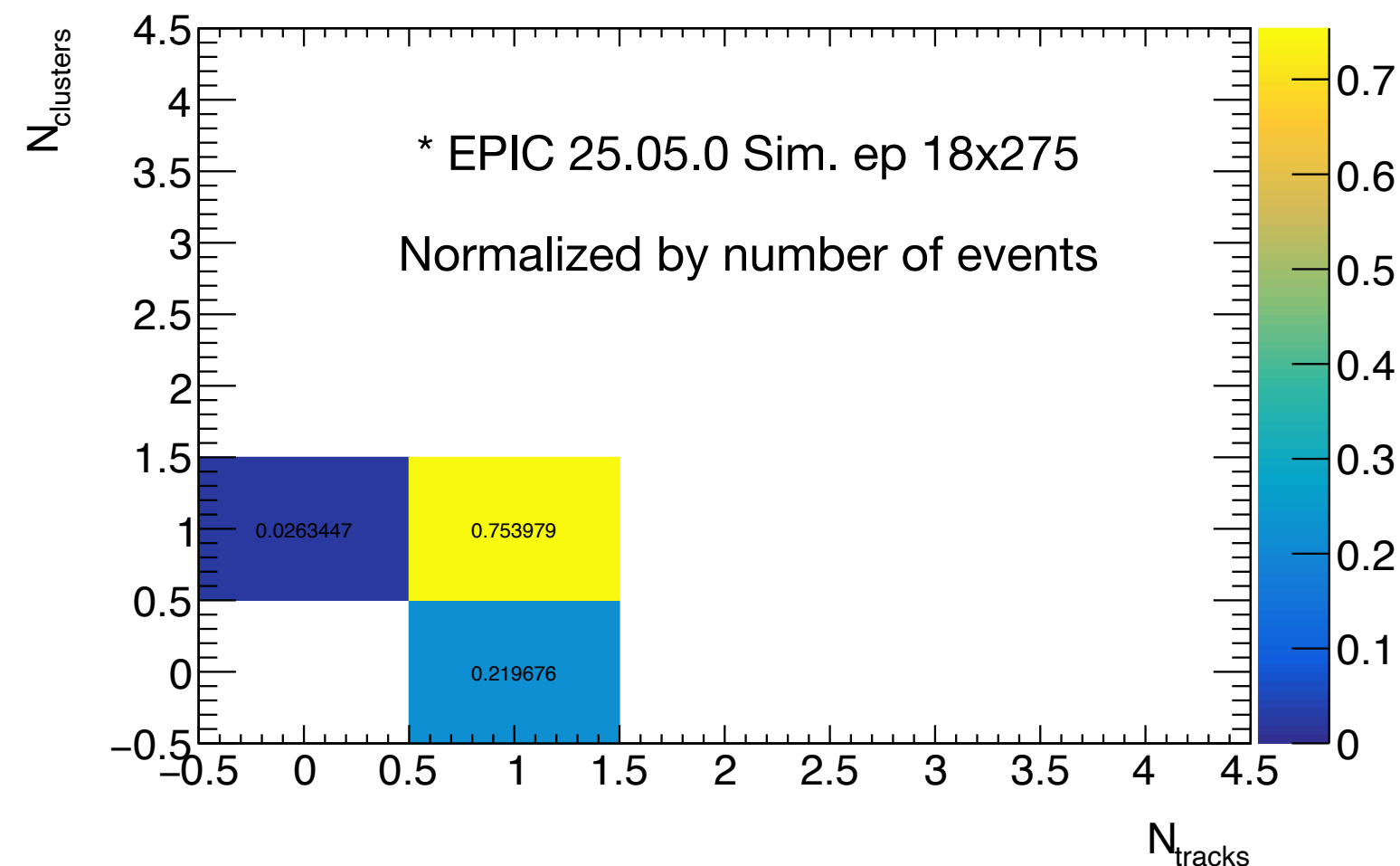


Three example ROOT macros are provided as examples on how to include the Electron Finder in your analysis. They can also be run to get a ROOT tree with the scattered electrons.

To run any of them, modify the beam setting, input files, and the type of electronID you want in the beginning of the file. Then run the ROOT macro in eic-shell.

- InclusvieSkim.C: Simple example on how to call the various functions in the electron library. Kinematics calculated using tracking and calorimeter information are also saved to the tree.
- InclusiveQA.C: Simple example on saving the scattered electrons to the output tree. QA plots for the cuts applied are made.
- ReconExample.C: Longer example for also testing the kinematic reconstruction using various algorithms.

- ▶ Use `edm4eic::ReconstructedParticleCollection ElectronID::FindScatteredElectron( )` to get detector-based eID



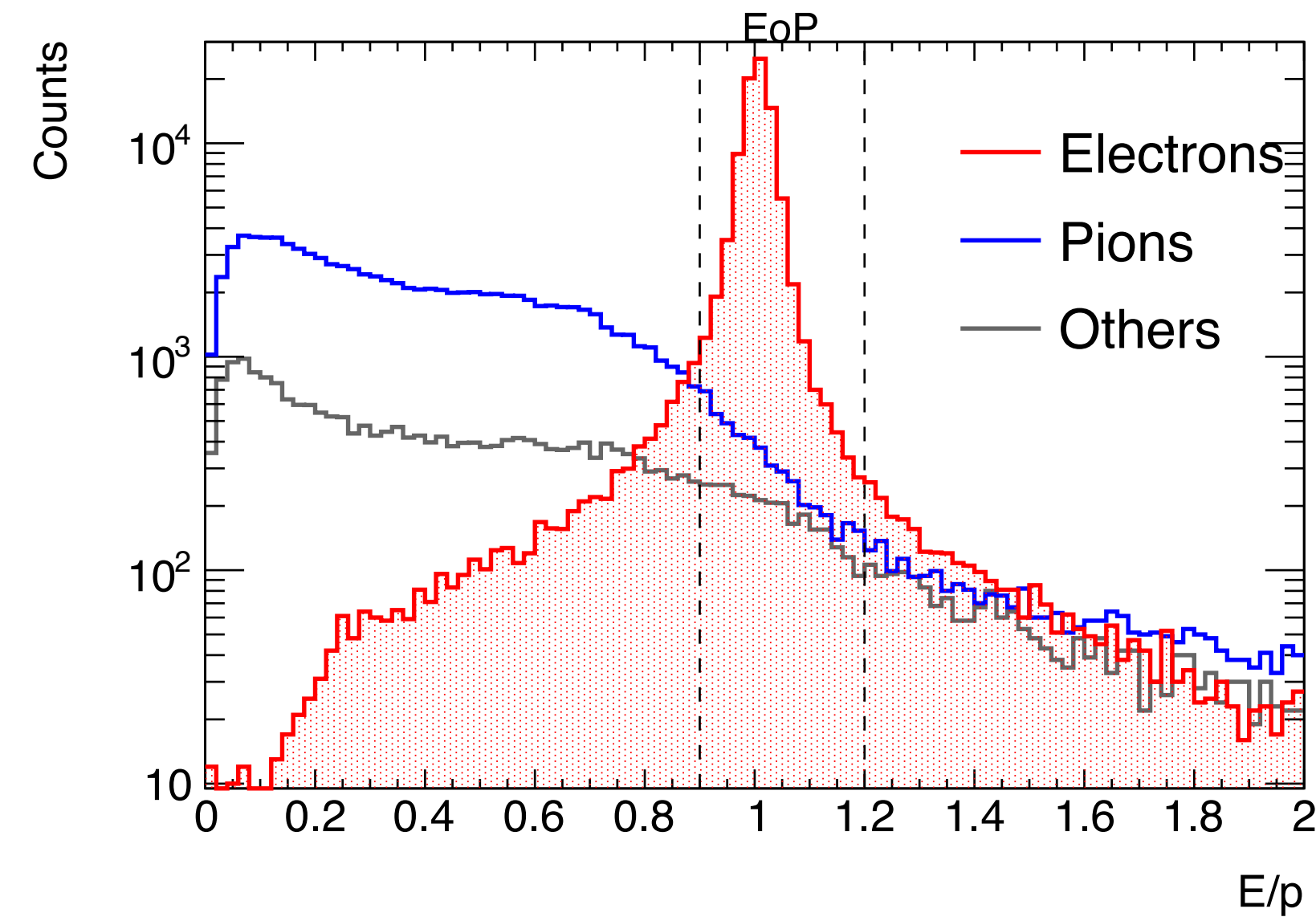
CAL sim. had issues in
07 and 08 campaign,
eID efficiency were low

eID procedure and performance

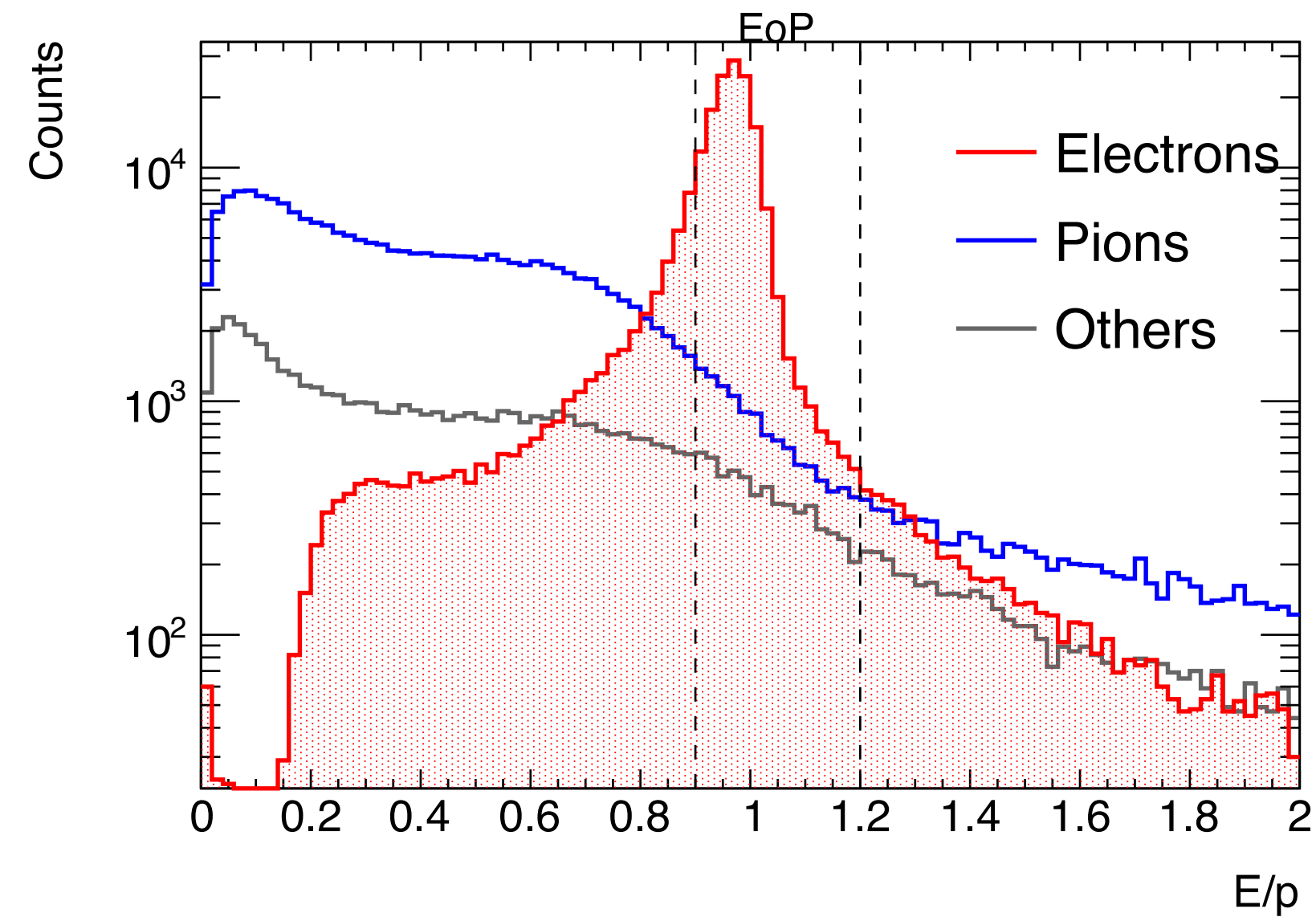
2

- ▶ Start from “ReconstructedParticleCollection” ← Currently still using MC to match clusters and tracks
- ▶ Require negative tracks
- ▶ $0.9 < E/p < 1.2$

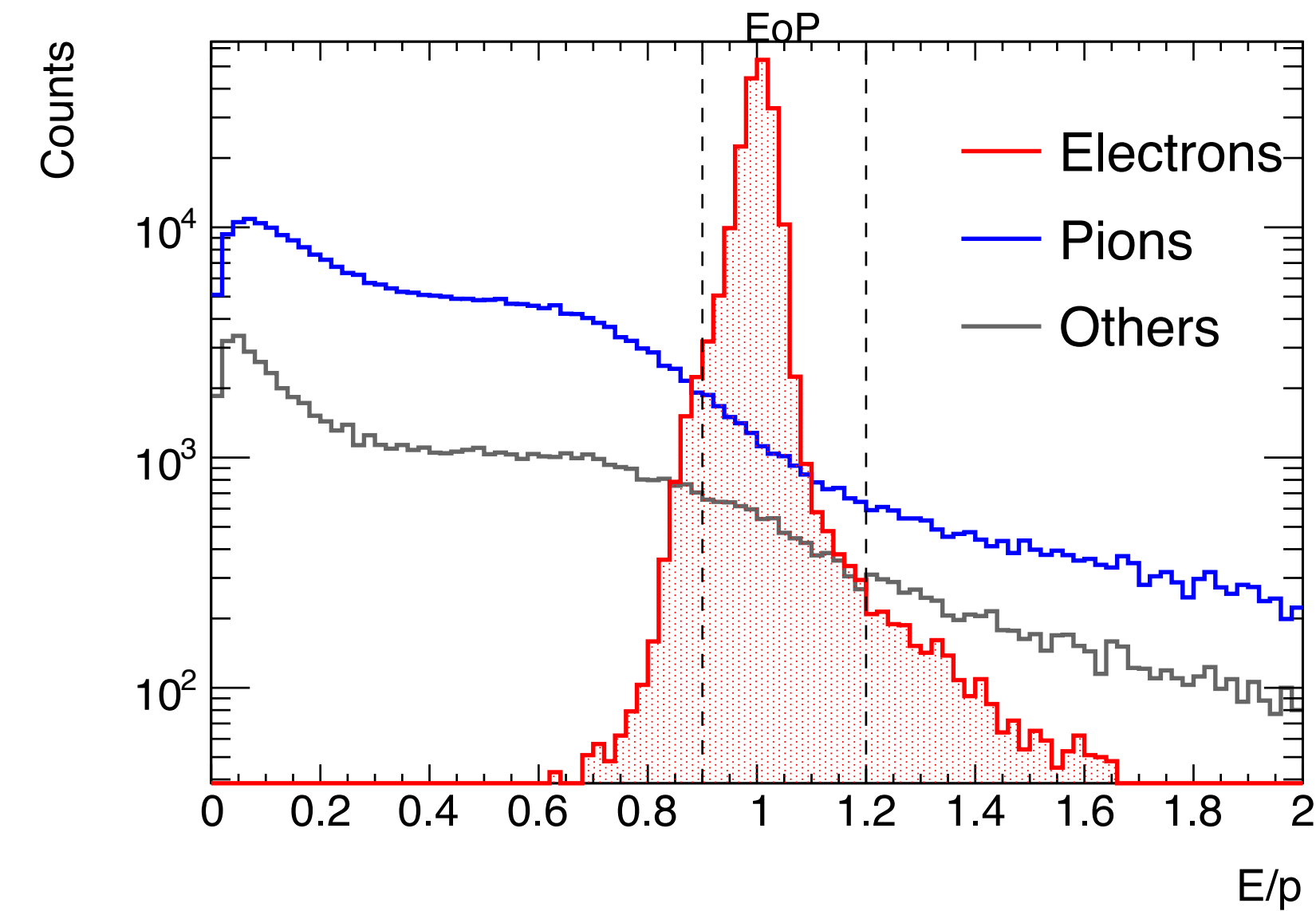
$$2 \leq Q^2 \leq 10 \text{ GeV}^2$$



$$10 \leq Q^2 \leq 100 \text{ GeV}^2$$



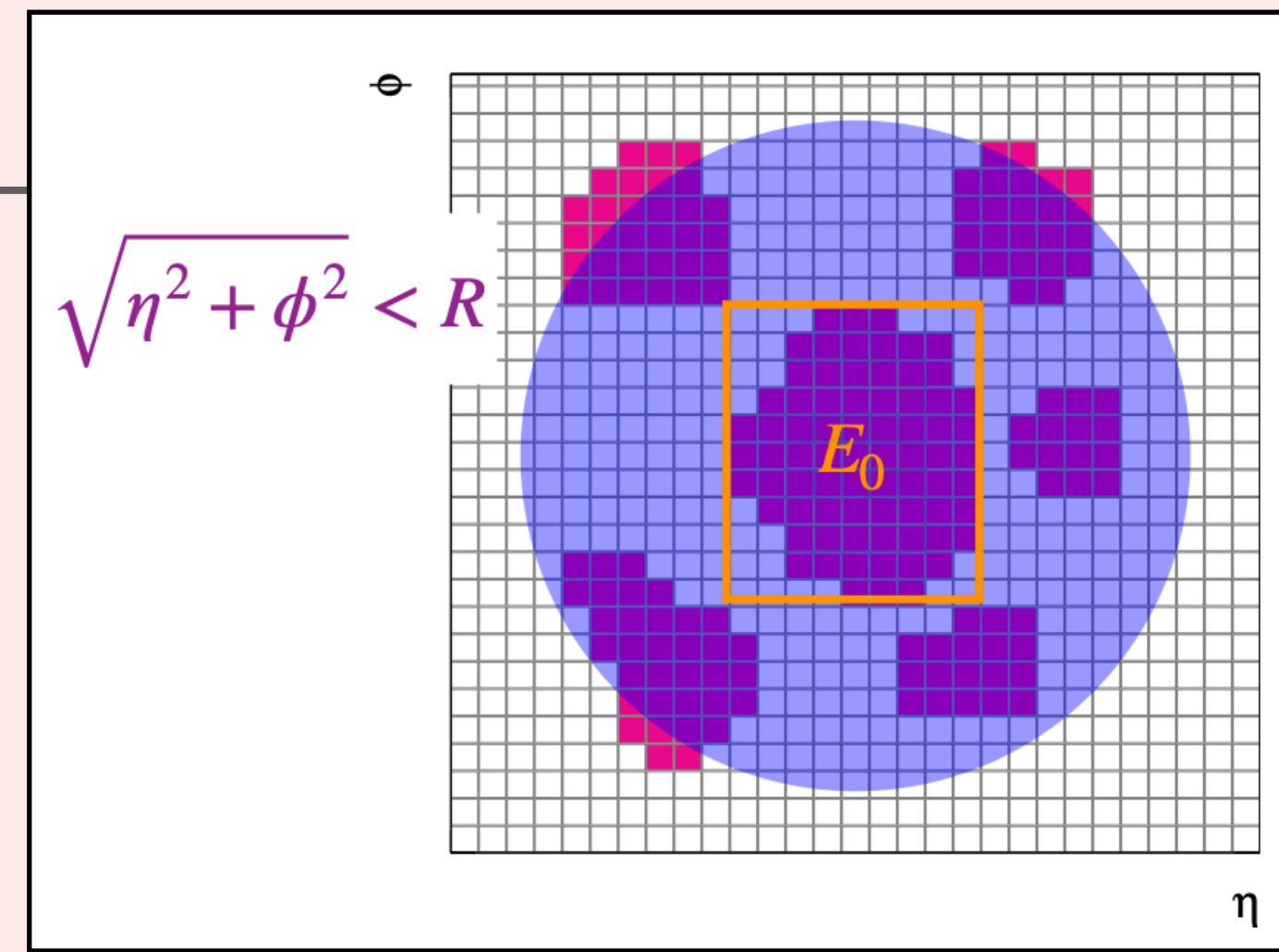
$$Q^2 \geq 100 \text{ GeV}^2$$



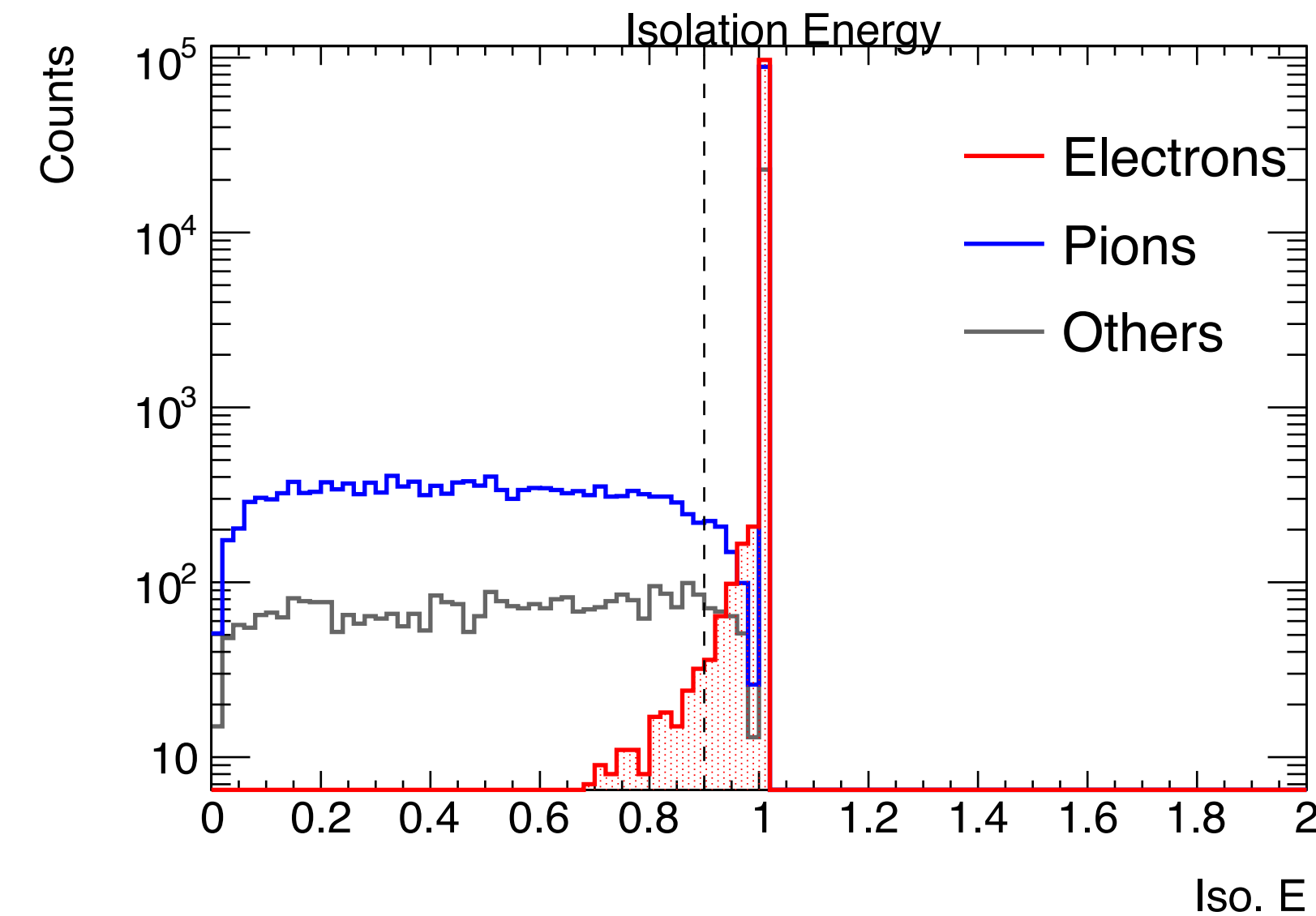
eID procedure and performance

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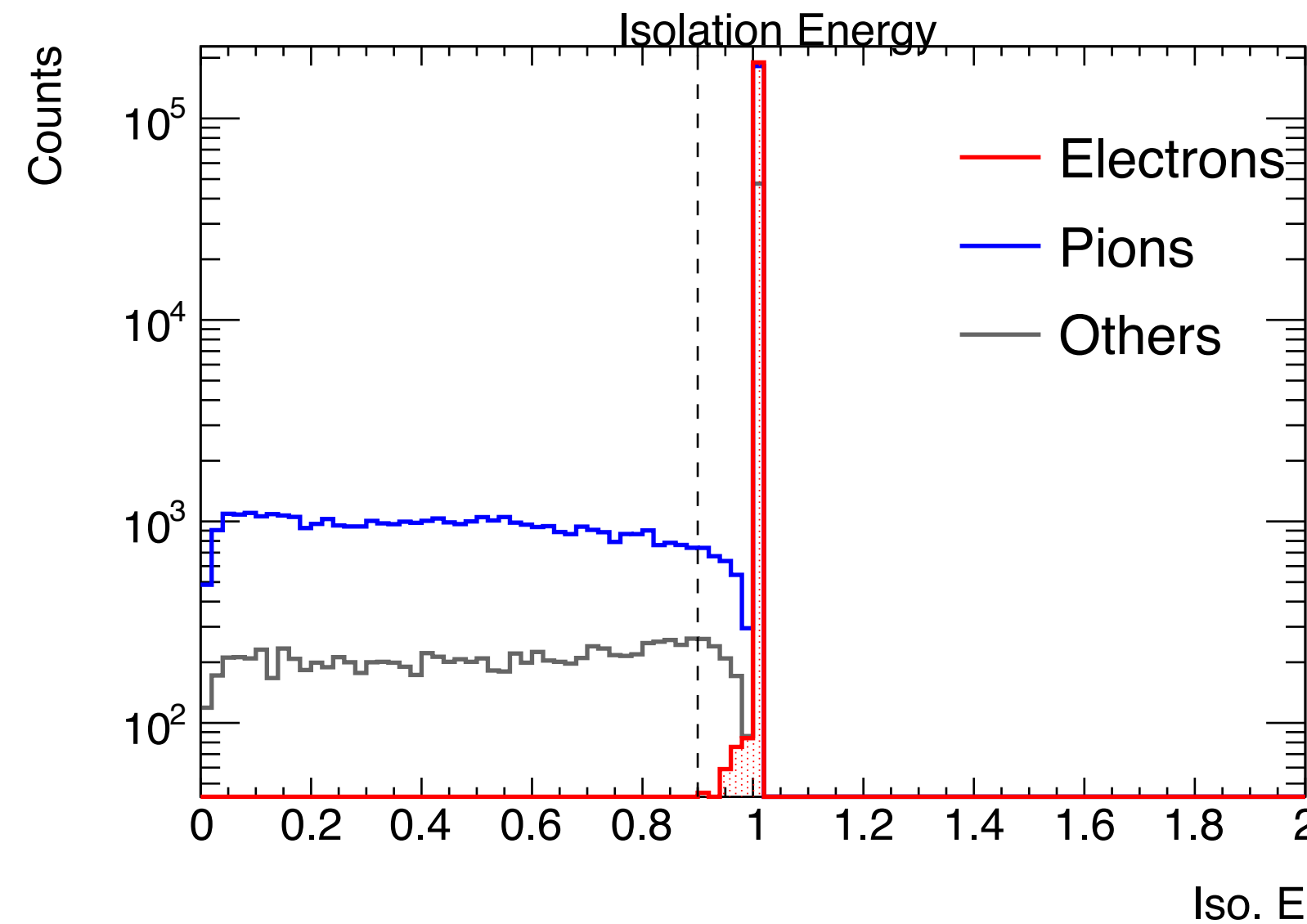
- ▶ Start from “ReconstructedParticleCollection”
- ▶ Require negative tracks
- ▶ $0.9 < E/p < 1.2$
- ▶ Isolated cluster: $R = 0.4$, $E_0/\Sigma E_R > 0.9$



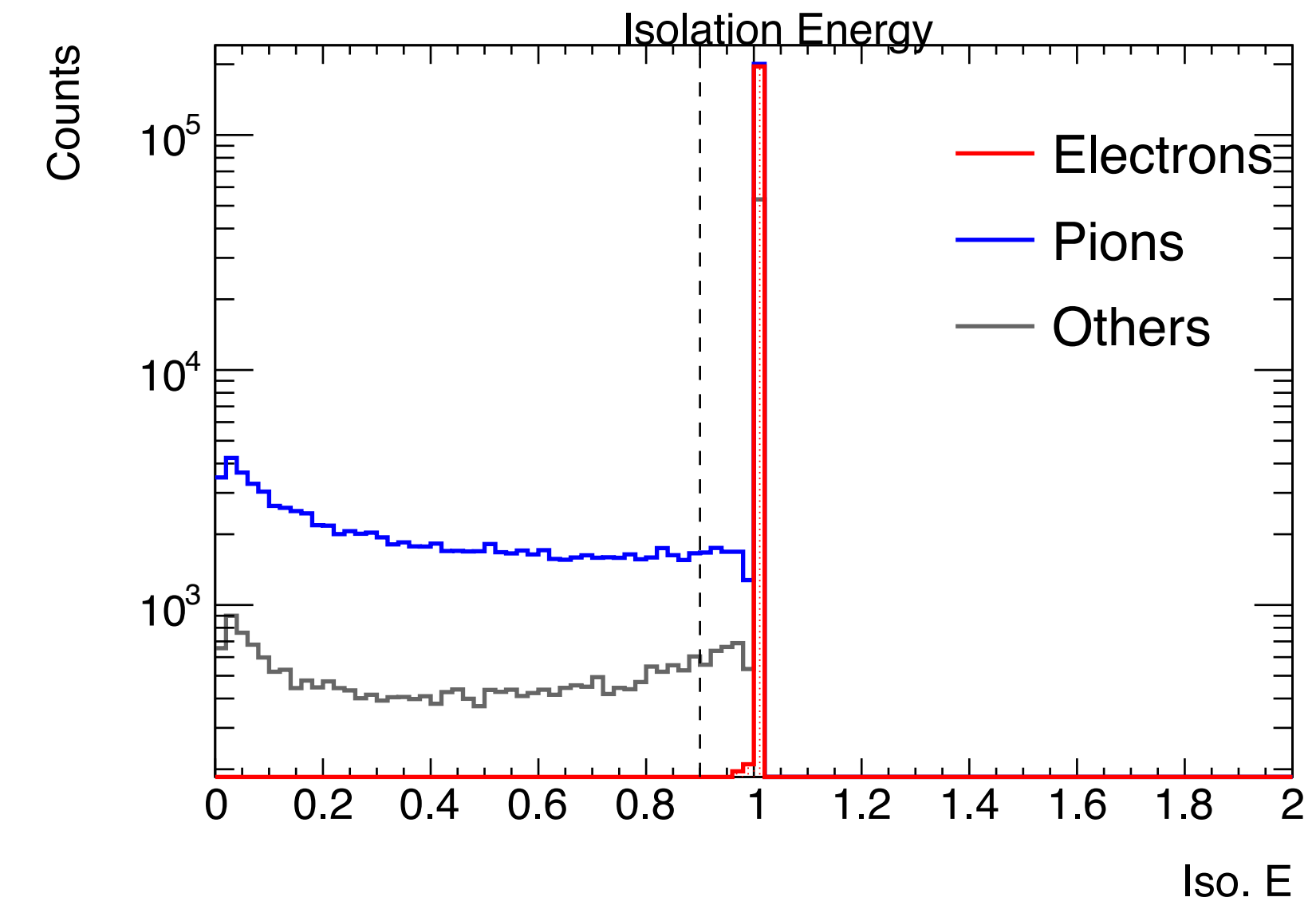
$$2 \leq Q^2 \leq 10 \text{ GeV}^2$$



$$10 \leq Q^2 \leq 100 \text{ GeV}^2$$

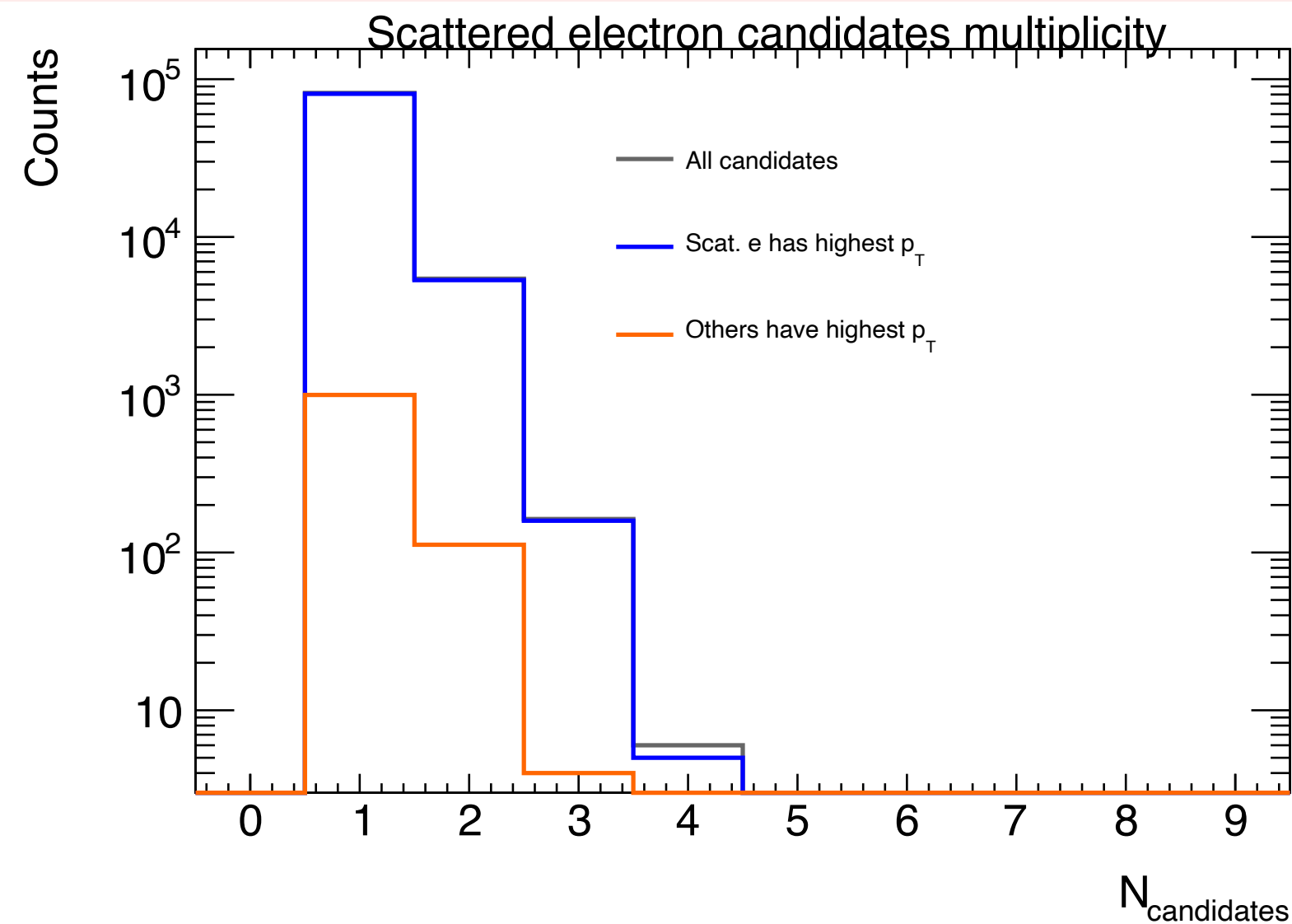


$$Q^2 \geq 100 \text{ GeV}^2$$

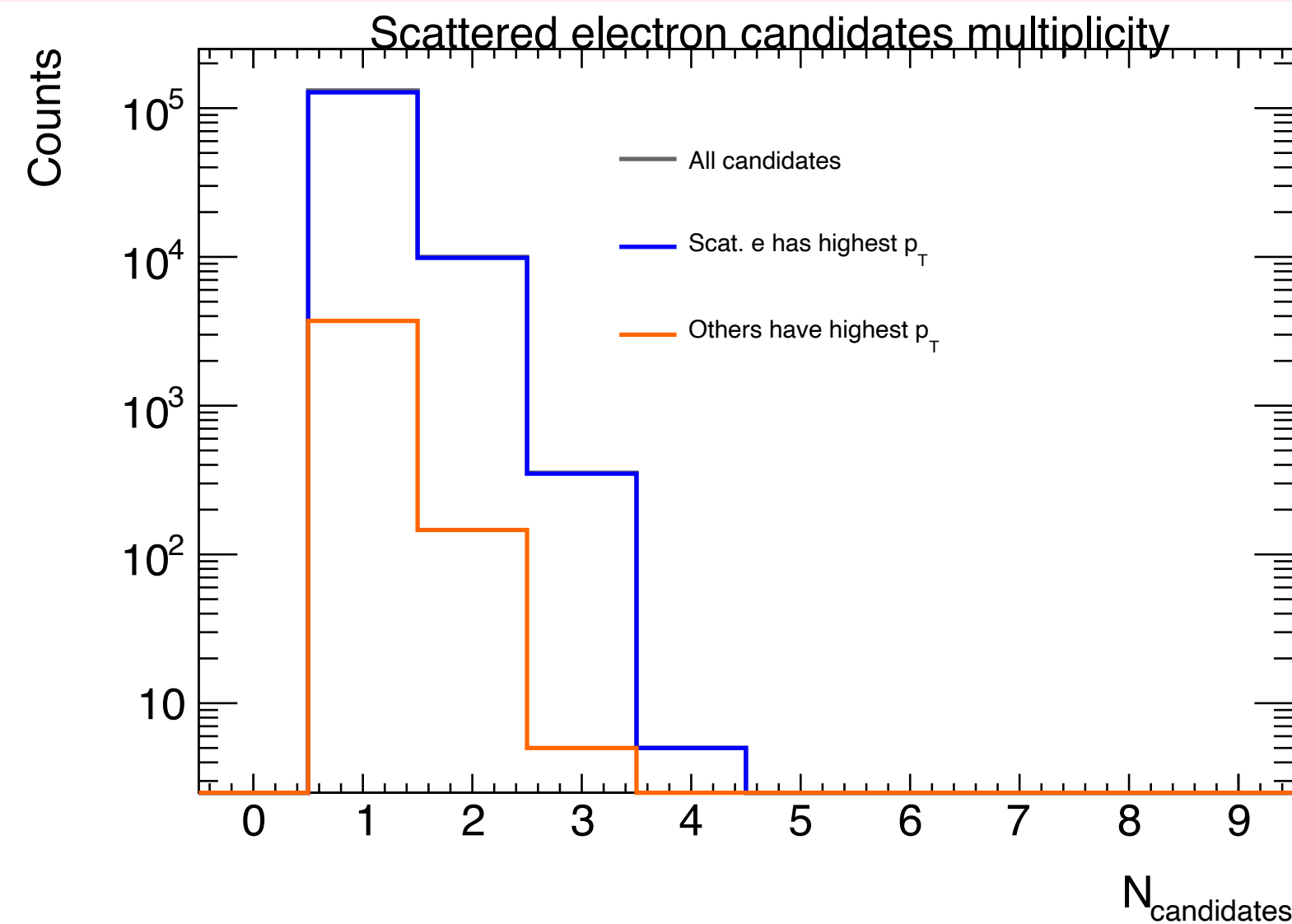


- ▶ Start from “ReconstructedParticleCollection”
- ▶ Require negative tracks
- ▶ $0.9 < E/p < 1.2$
- ▶ Isolated cluster: $R = 0.4$, $E_0/\Sigma E_R < 0.9$
- ▶ Select the highest P_T particle

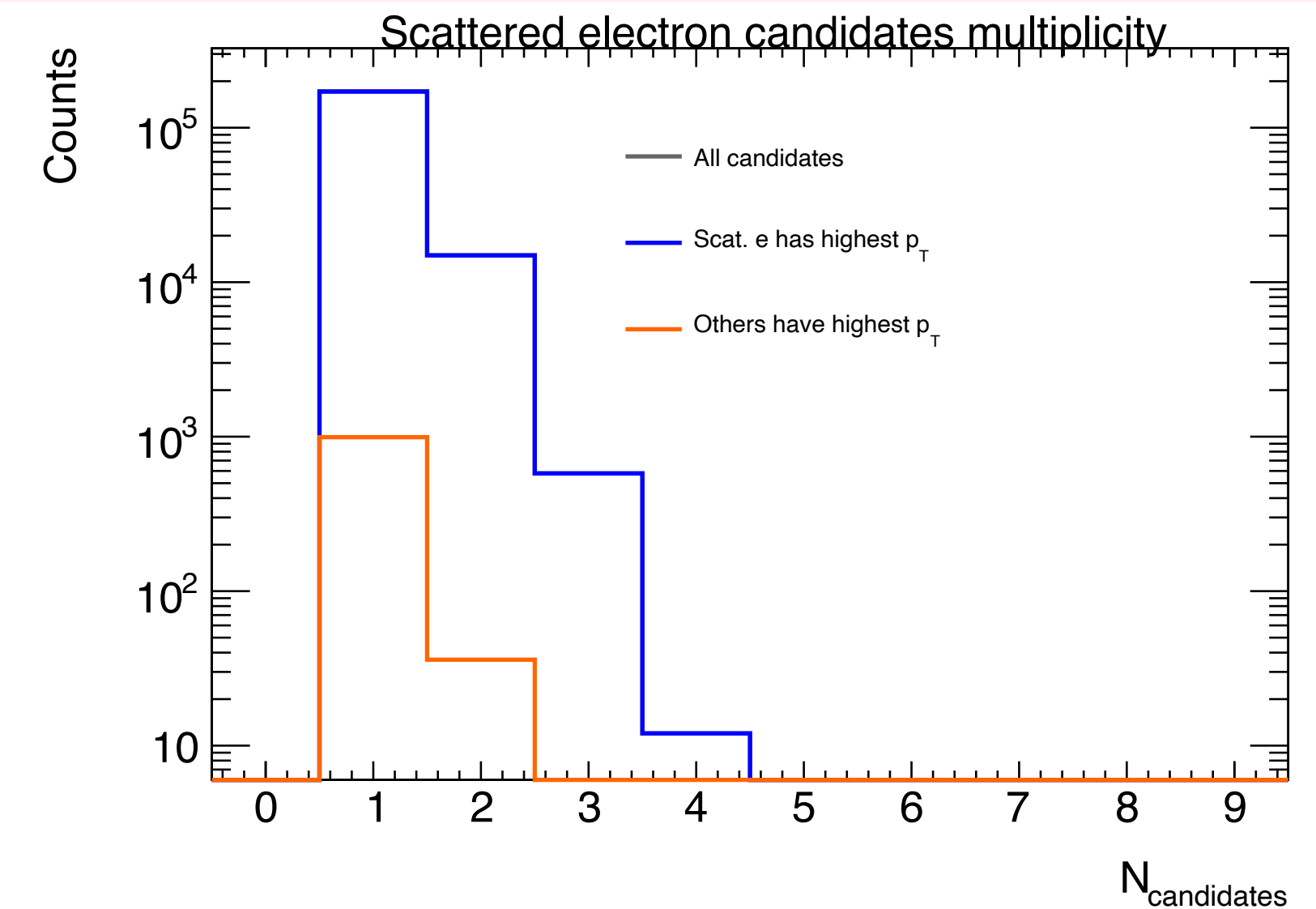
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$$Q^2 \geq 100 \text{ GeV}^2$$

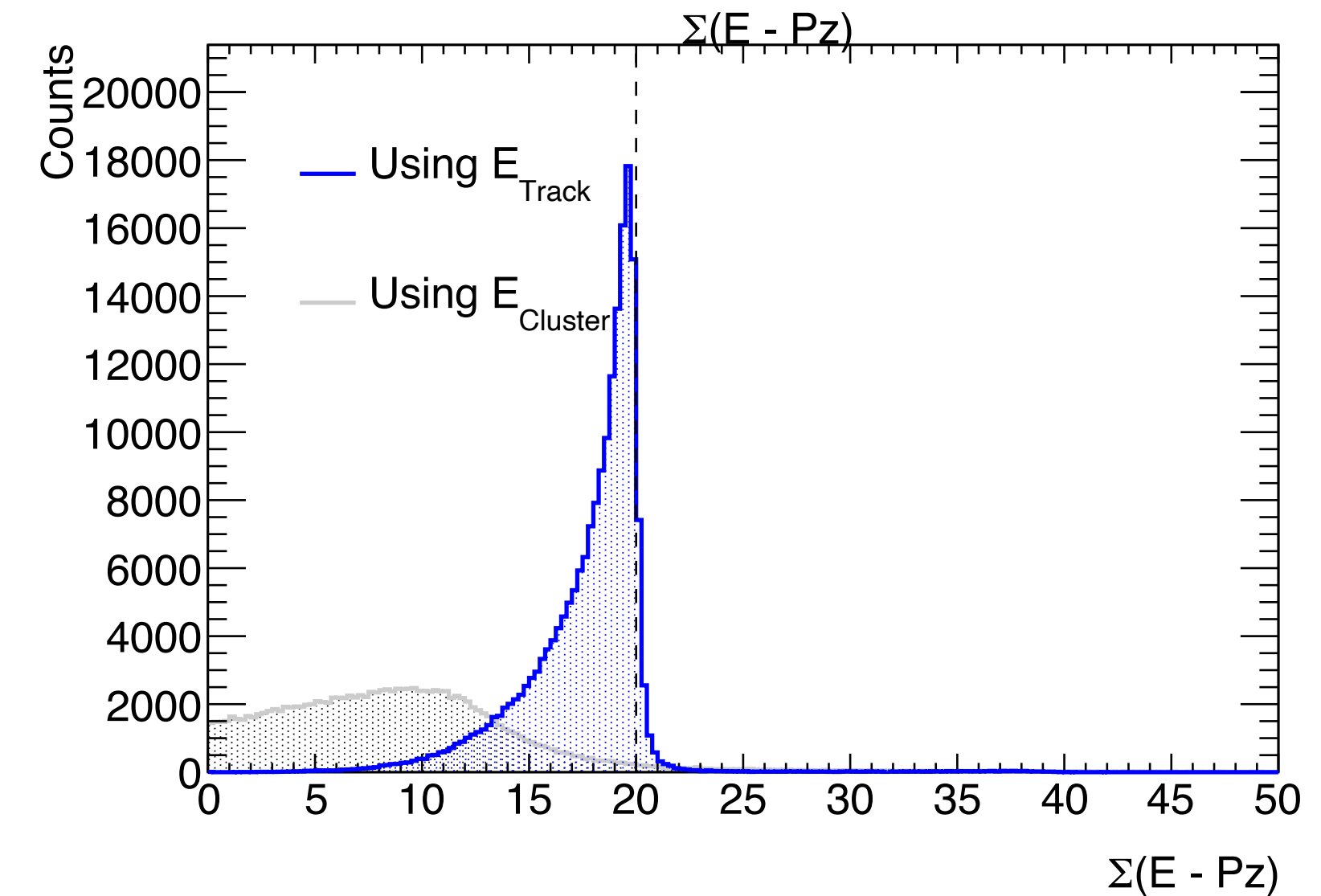
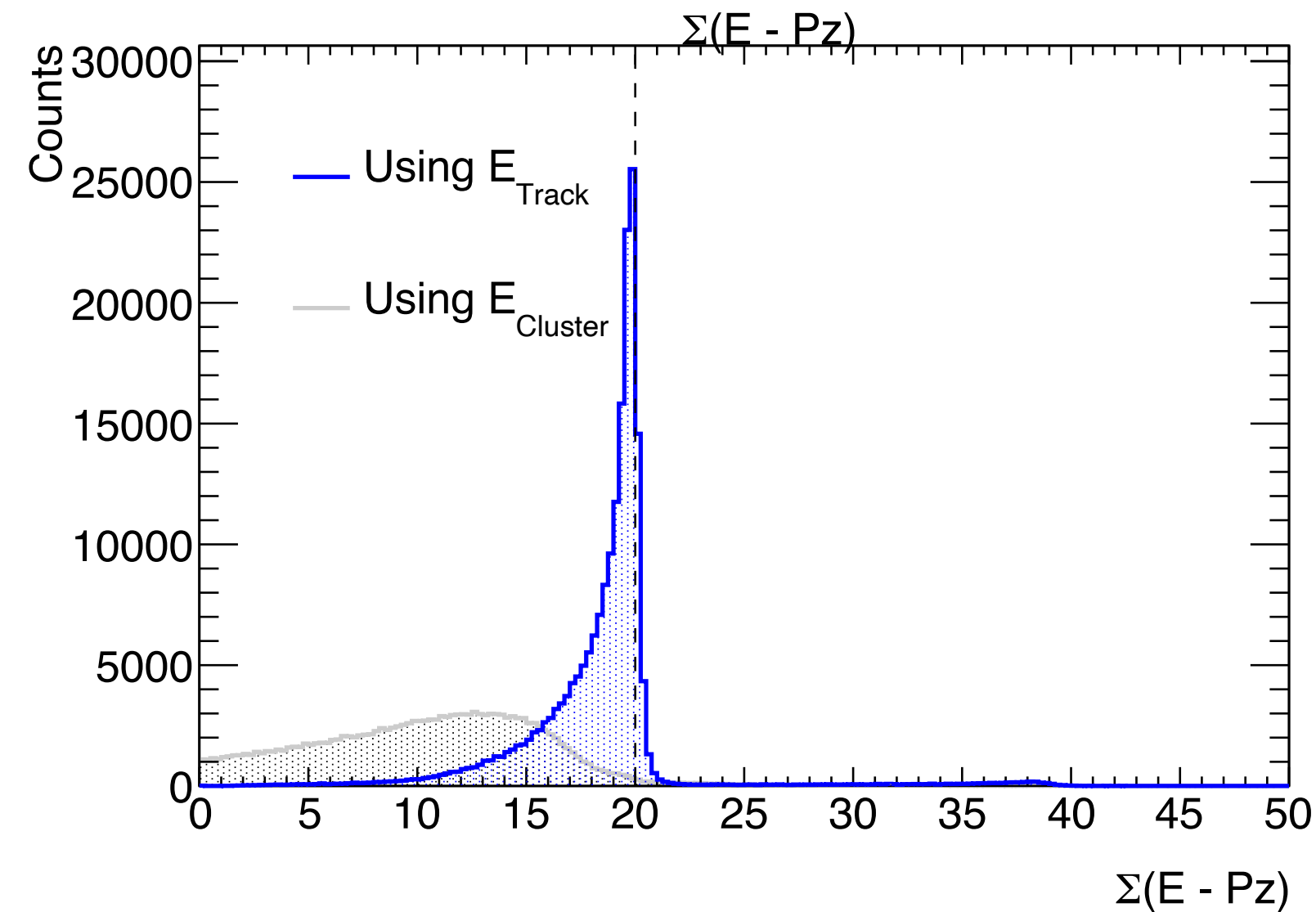
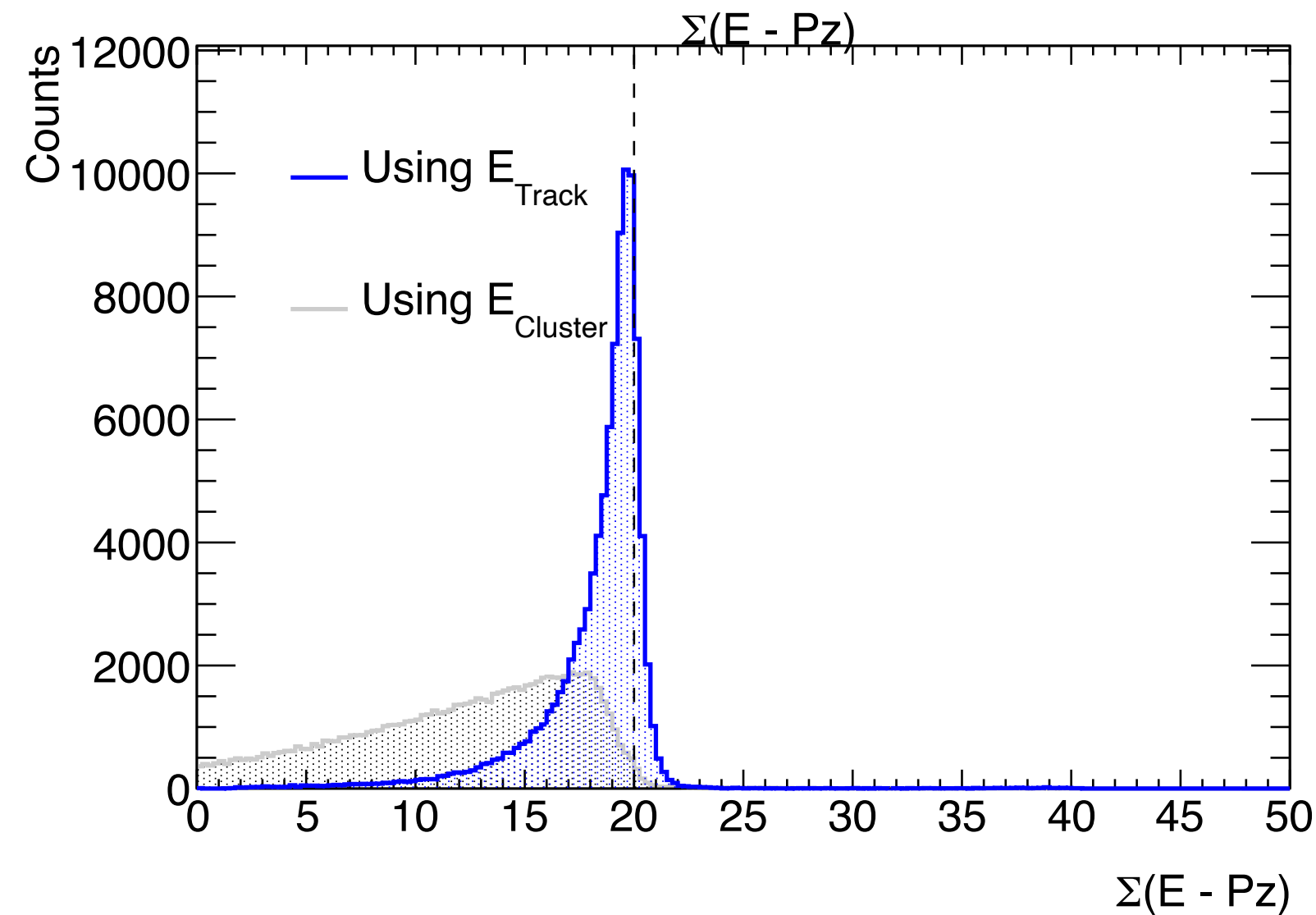


- $\Sigma(E - P_z) \approx 2E_e$, smaller for QED ISR, photoproduction events
- This value can be calculated using Electron Finder, but it is not in the default cut

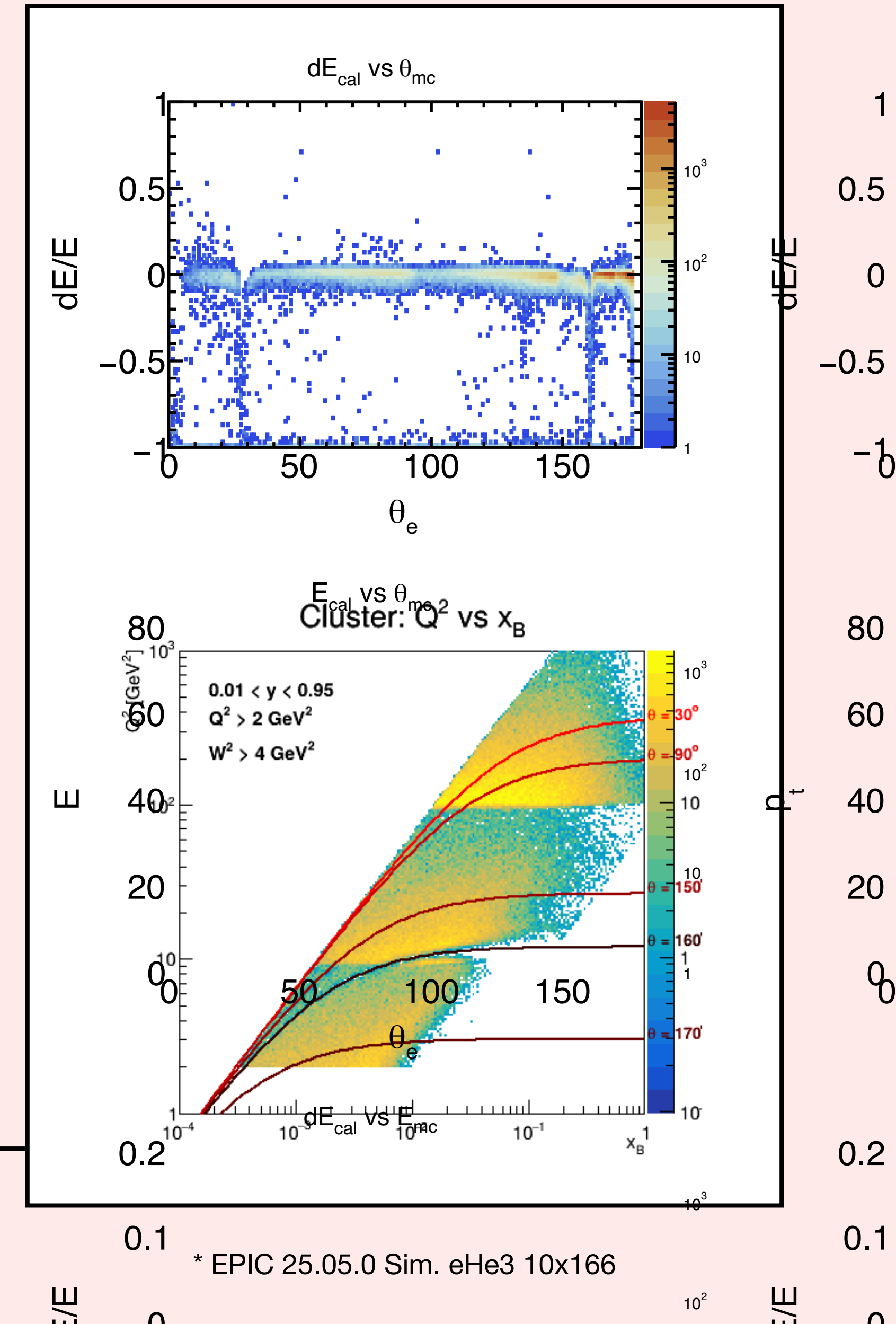
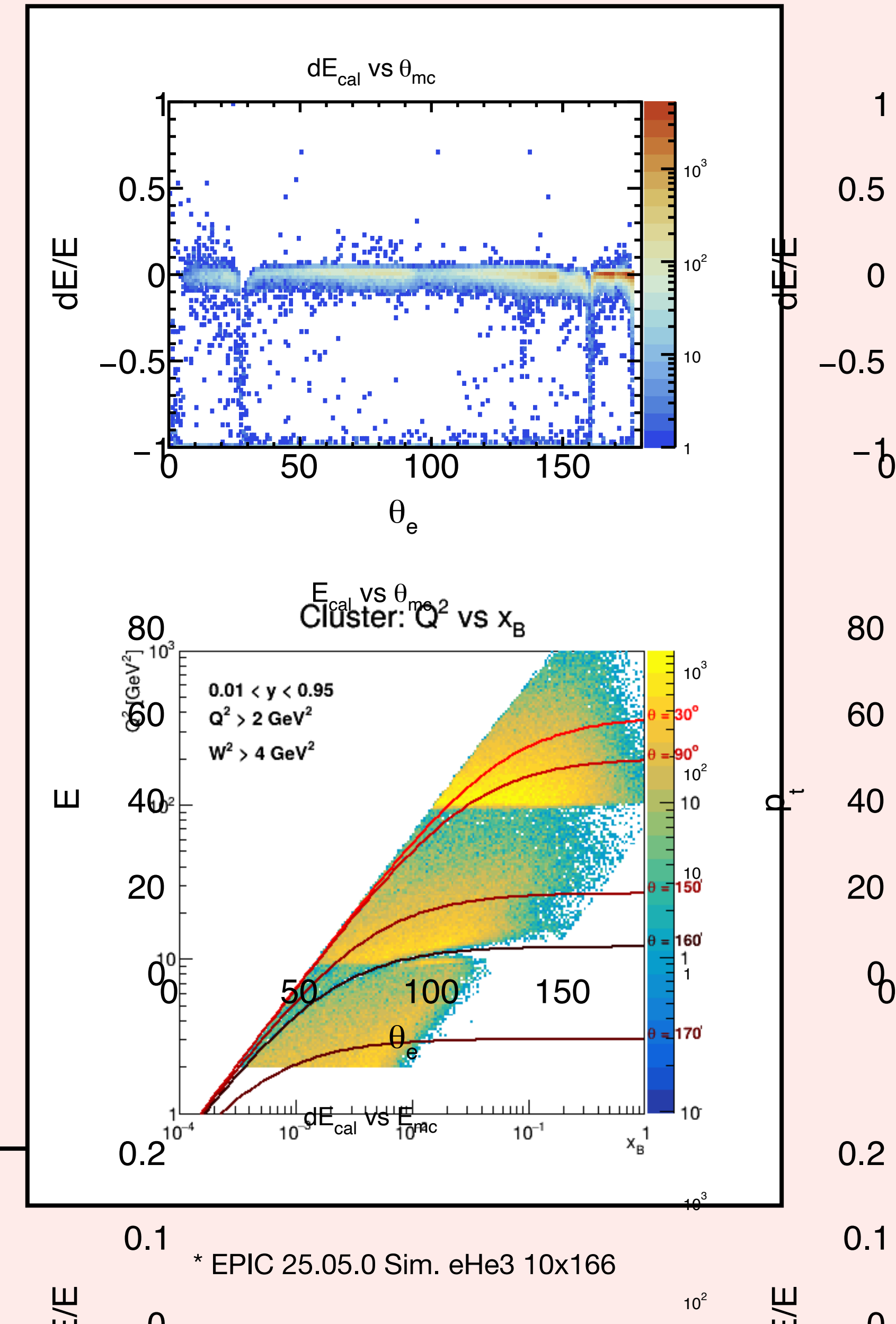
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$$Q^2 \geq 100 \text{ GeV}^2$$



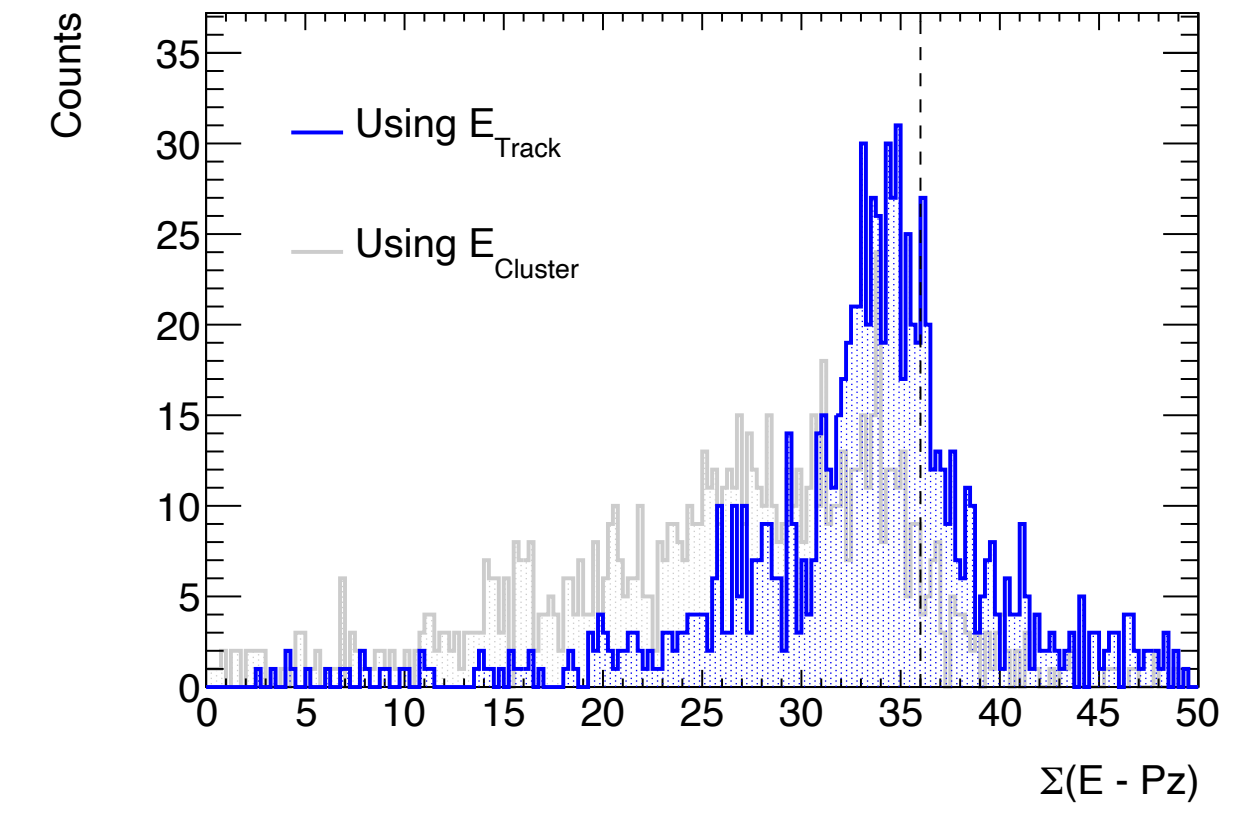
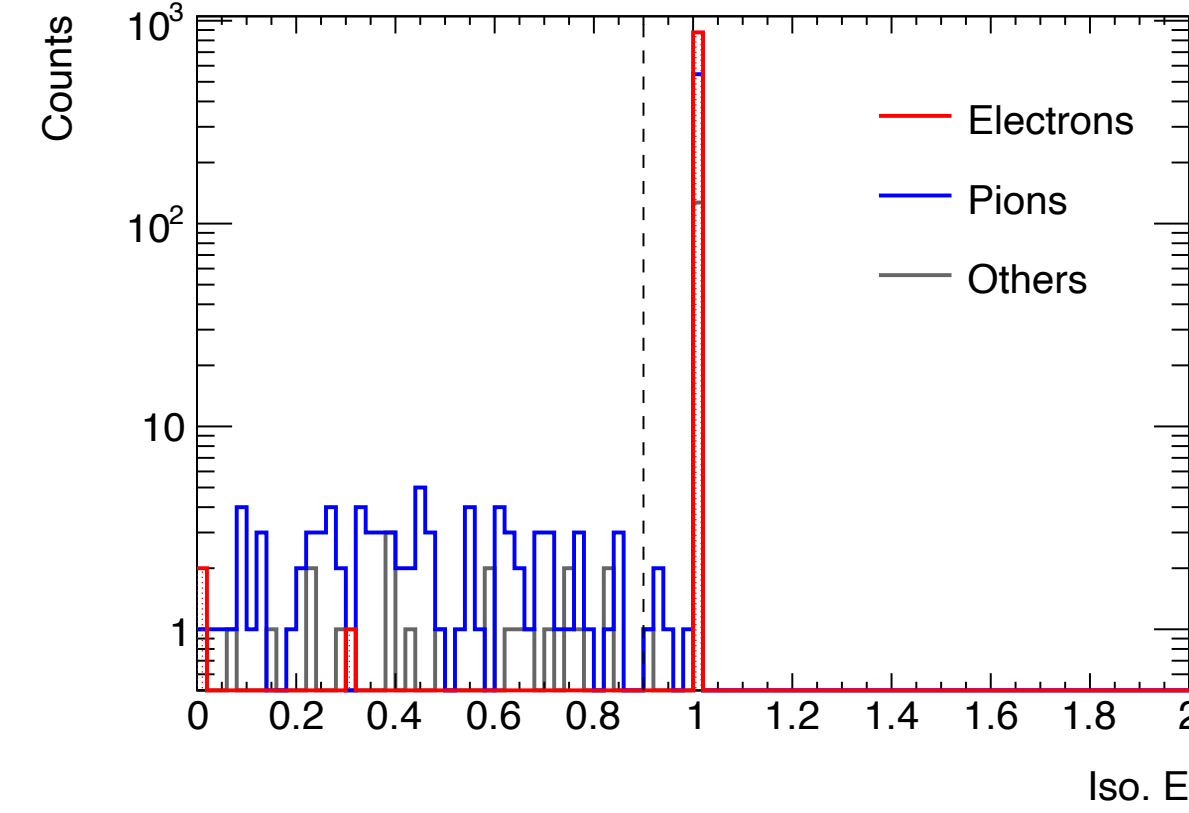
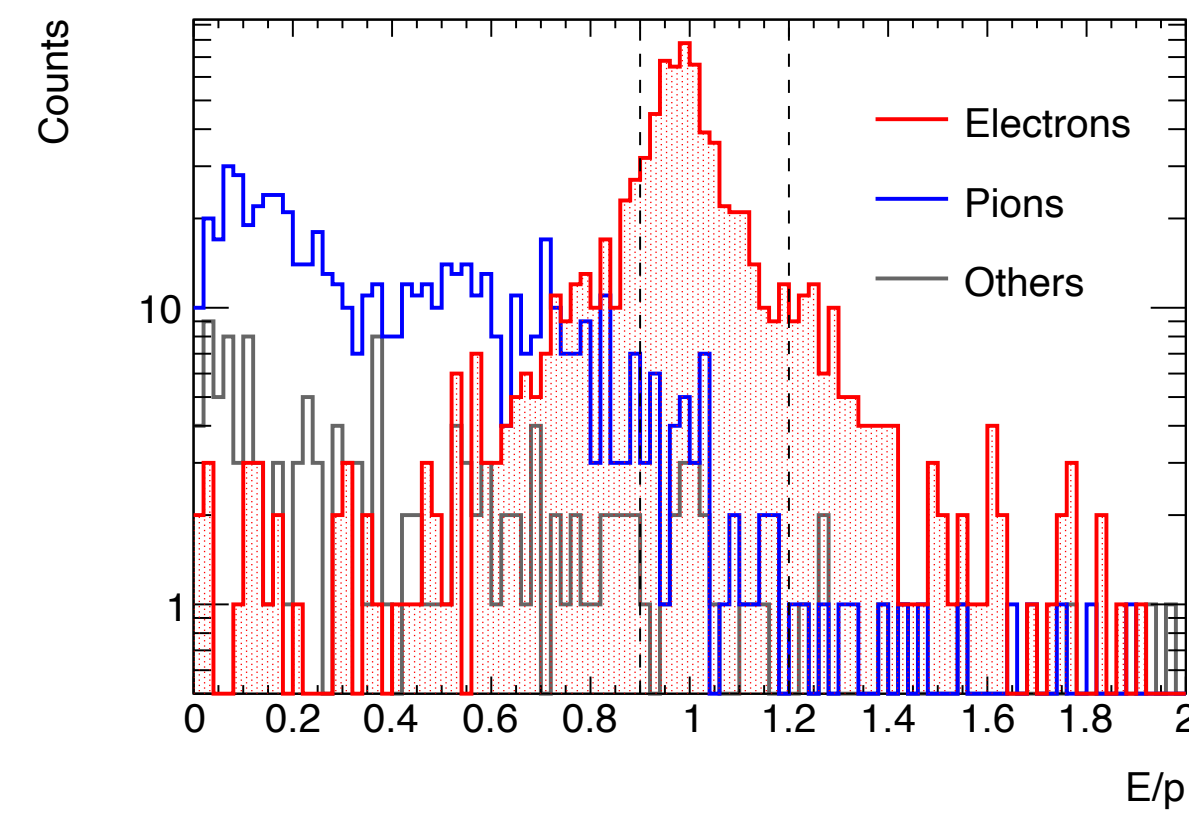
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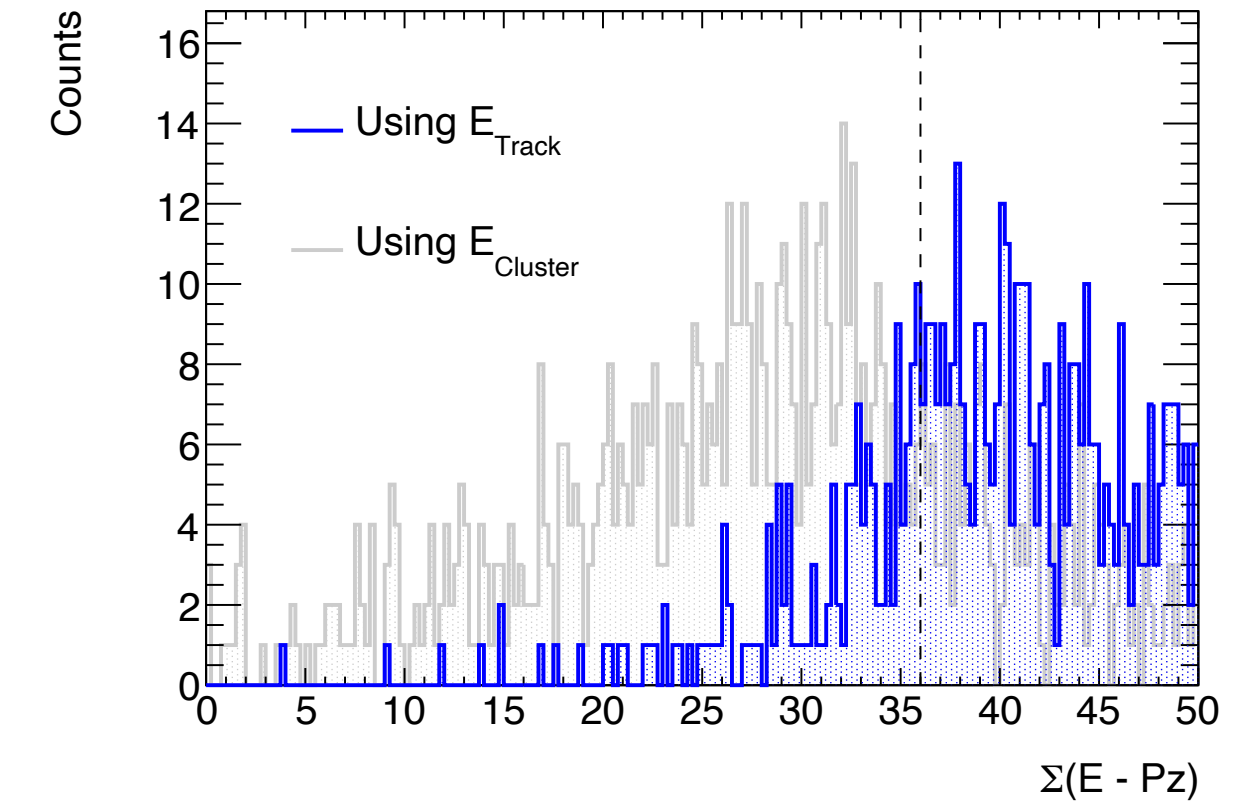
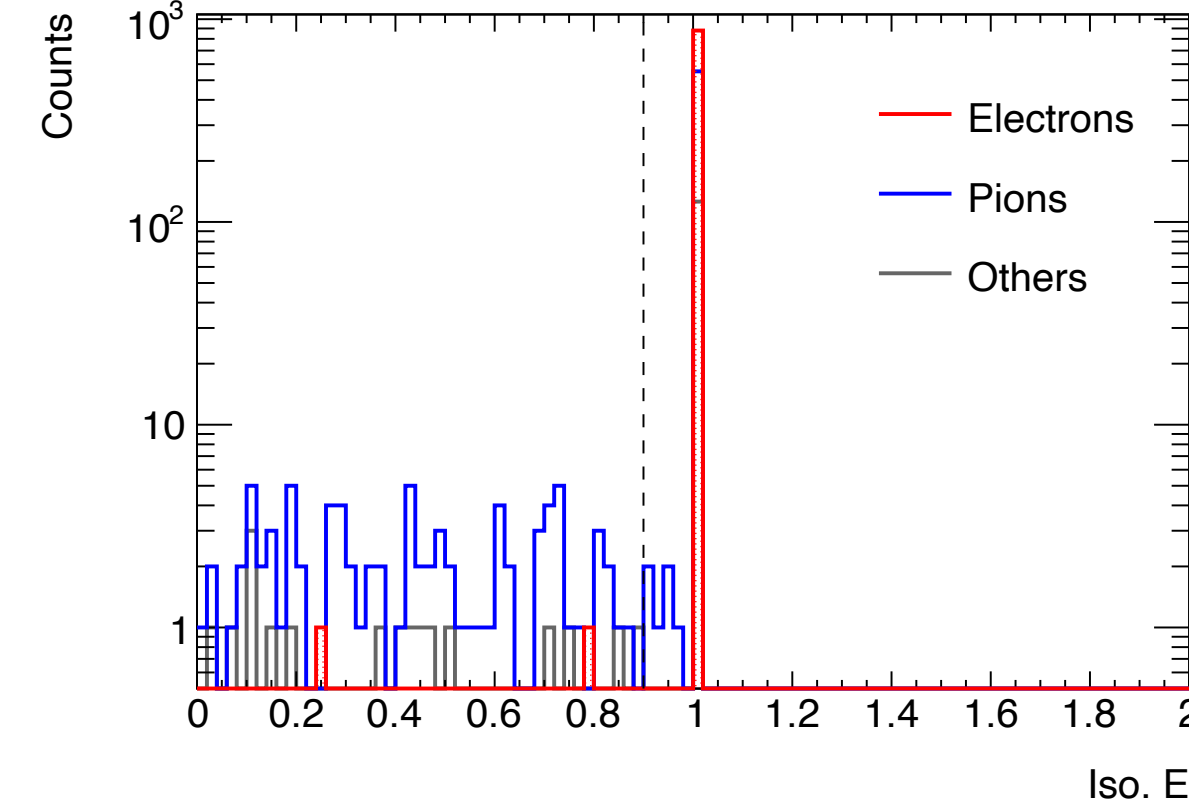
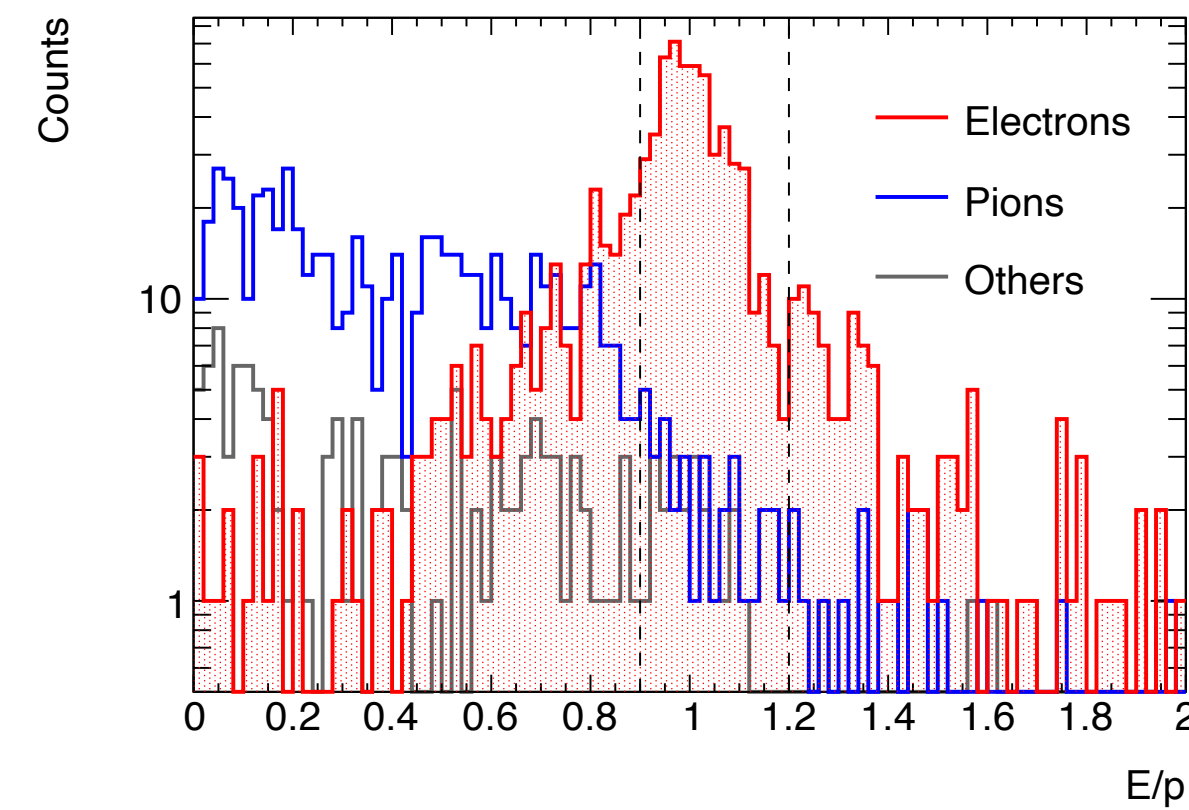
eID with beam background (1 DIS event w. $2\mu s$ bg.)

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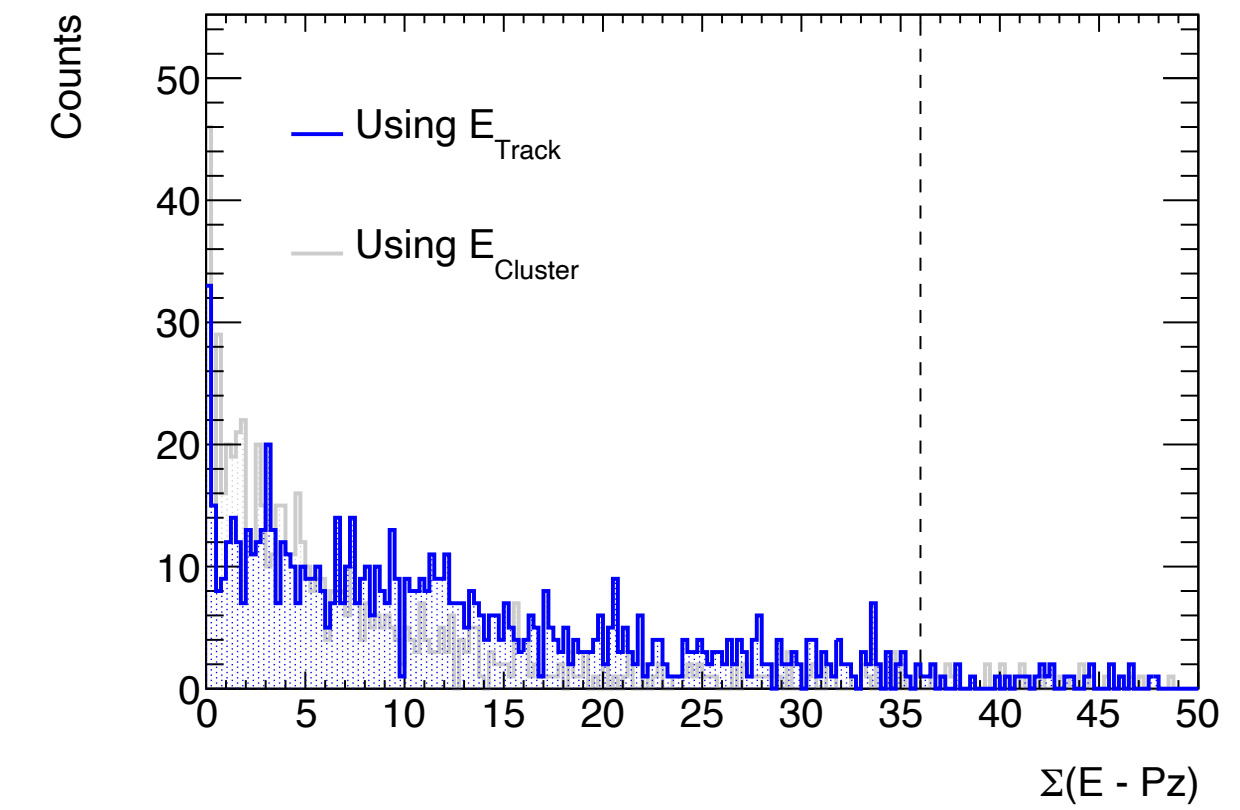
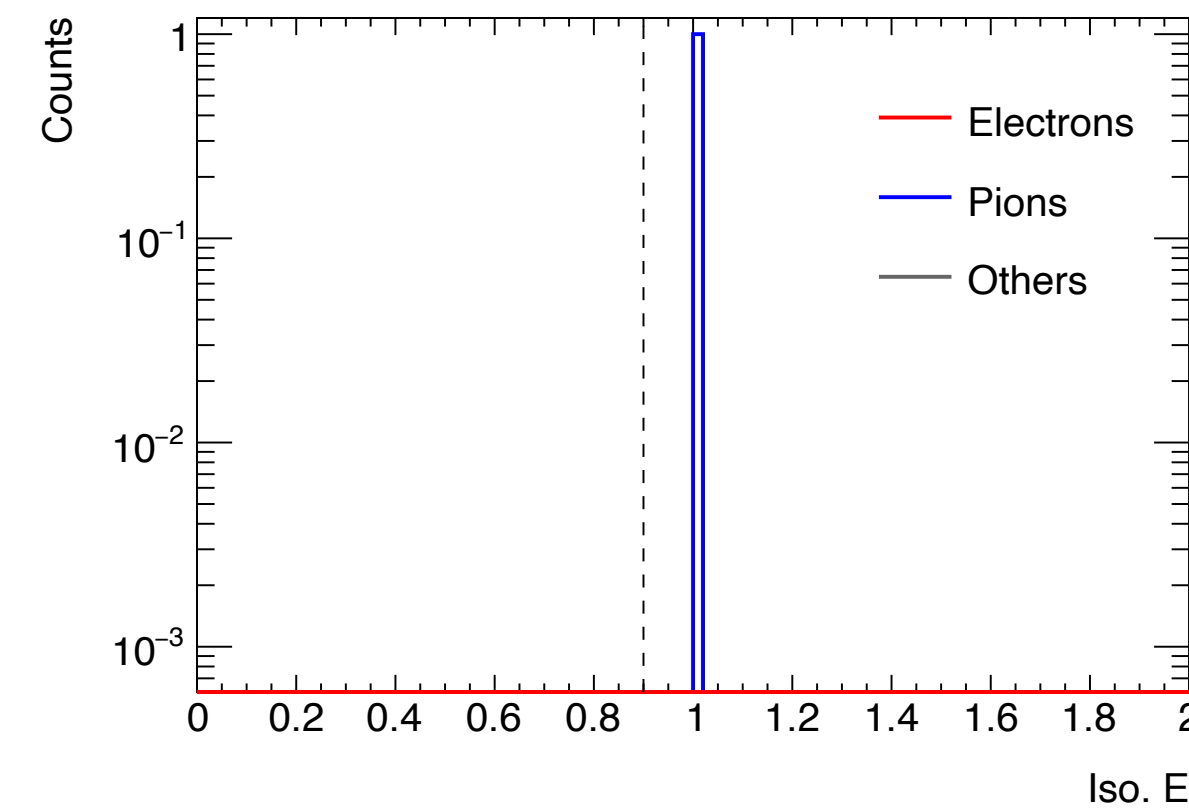
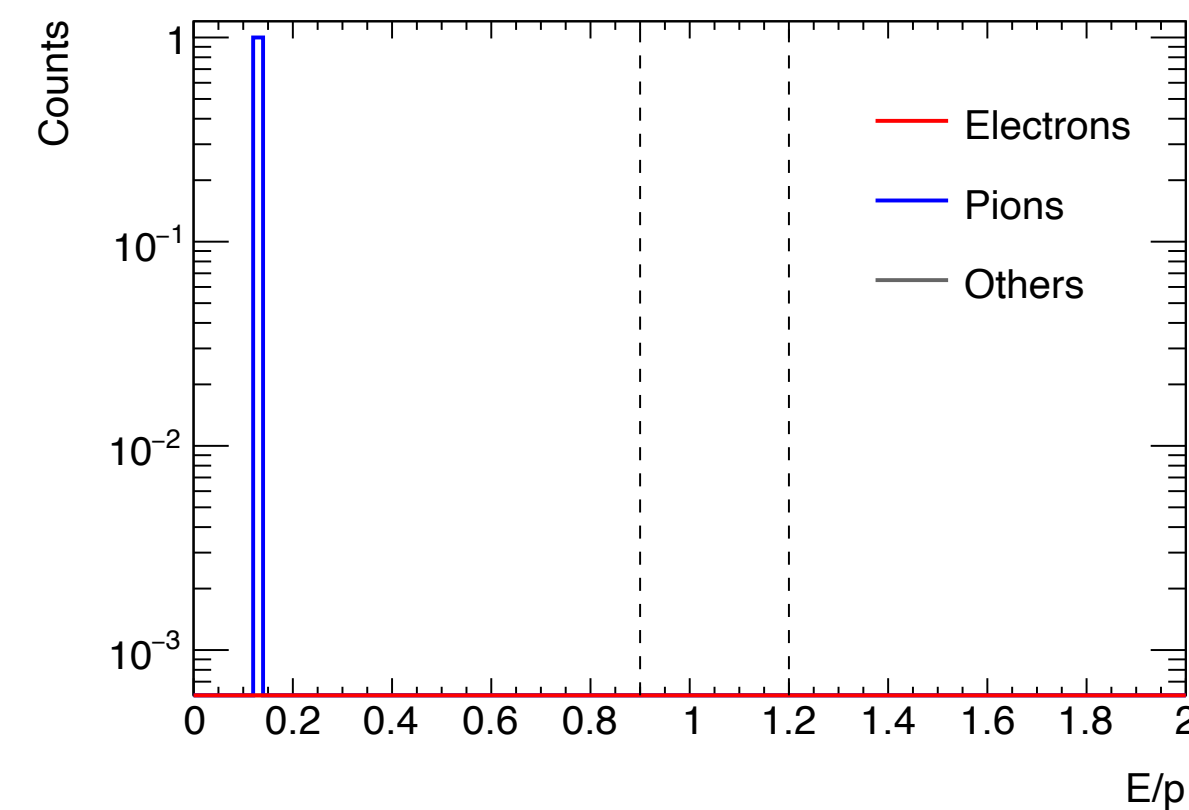
► DIS, no background



► DIS + Background



► Background only



* 18x275 ep samples with 1000 events