



LOUISIANA STATE UNIVERSITY



Generic Neutrino Selections Using Wirecell Reconstruction

SBND Sim-Reco Meeting

Prabhjot Singh, 22 Sep 2026



Prabhjot

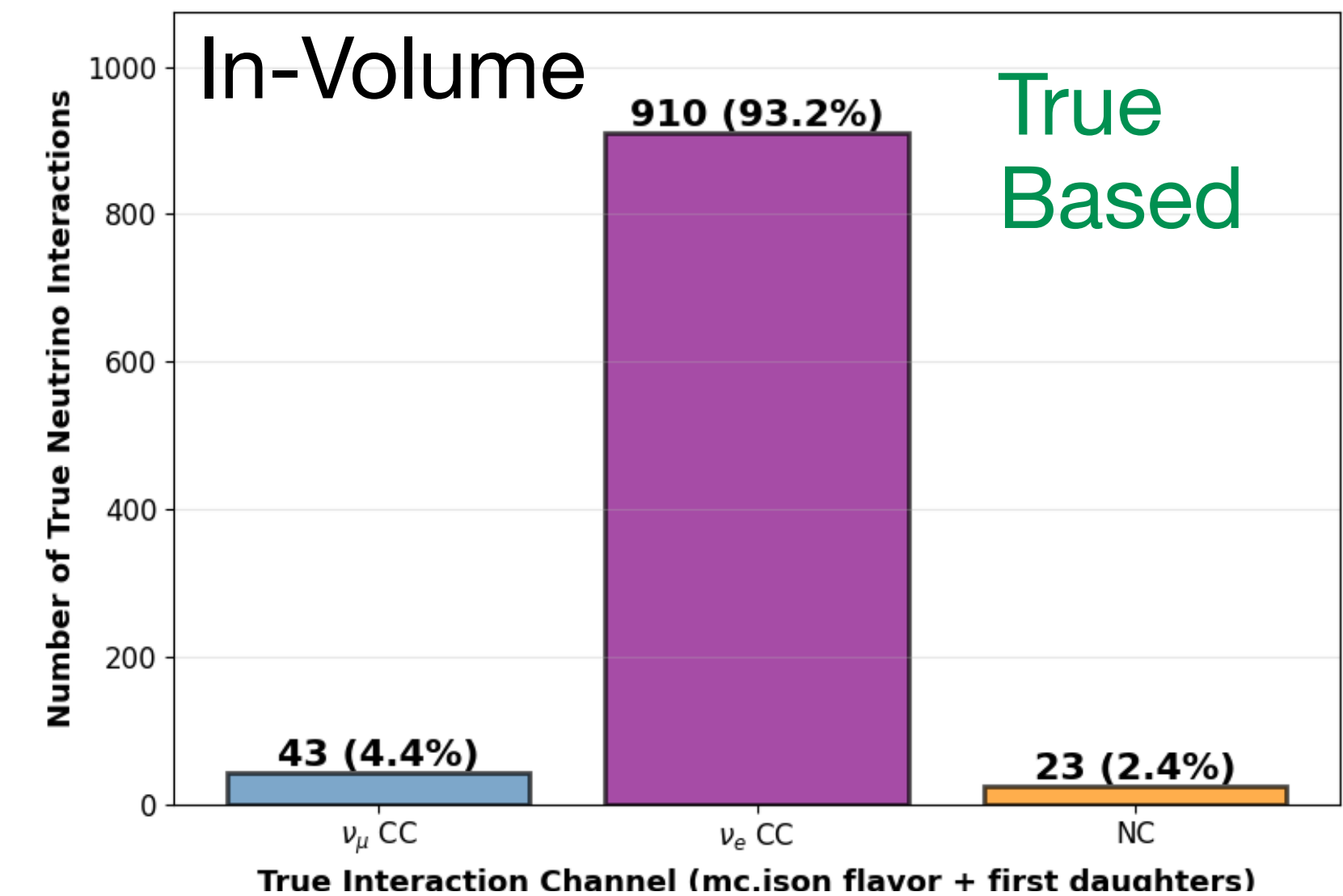
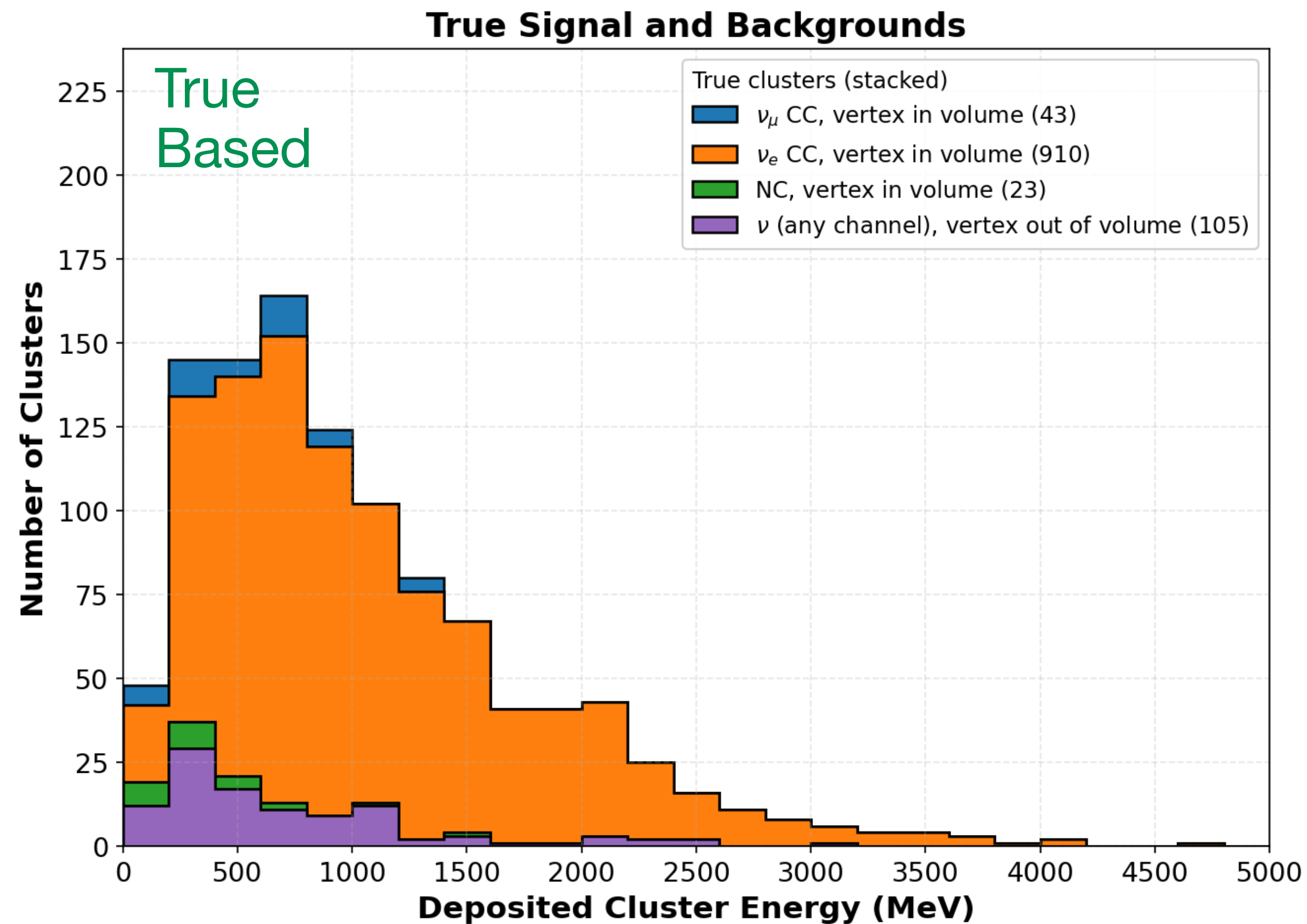
For Wirecell Meeting

Introduction and Overview

- The purpose of this talk is to present our current status of generic neutrino selections to select $\nu_\mu CC$, $\nu_e CC$, and NC interactions
- Also to present the quality and accuracy of the wirecell reconstruction
- Previously in the SBND reco meeting we presented status and performance based on Beam Light MC sample which are predominately $\nu_\mu CC$ (80%) and some fraction of $\nu_e CC$ (1%), and NC (19%) interactions
- We showed that our generic neutrino selection have high efficiency (~90%)
- The MC sample was predominately $\nu_\mu CC$ and very few $\nu_e CC$ so we were not able to say anything about how good our generic neutrino selections (up to in-beam window cut only) perform for $\nu_e CC$ interactions
- In this stage particle-identification (PR) is also included so to check reconstruction performance for $\nu_e CC$ interactions we have used $\nu_e CC$ dominated sample

True Neutrinos

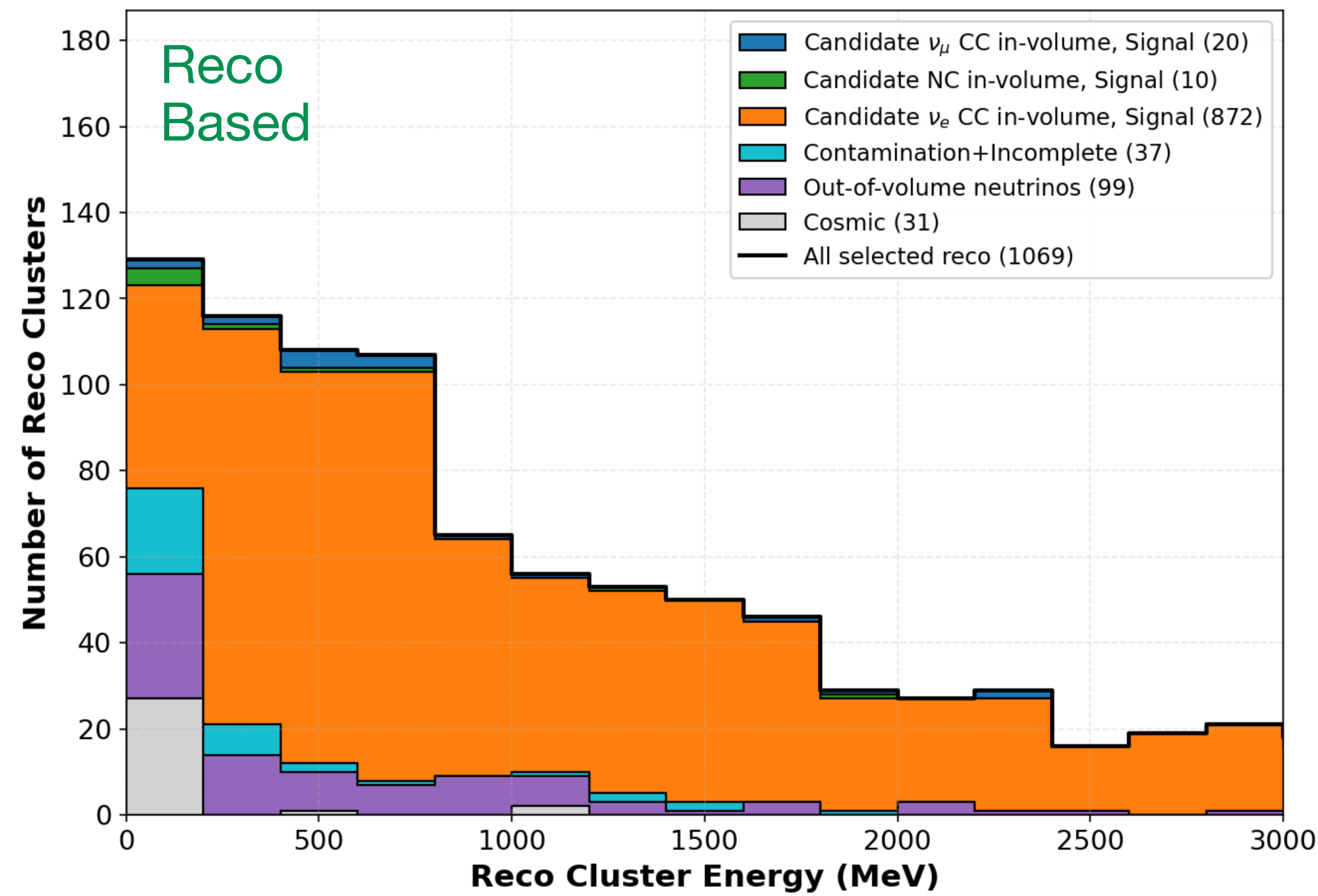
Number of Files	100
Events	1000



- Input dataset is $\nu_e CC$ dominated Gen2 sample
- $\nu_\mu CC$ and NC are piled up interactions with $\nu_e CC$

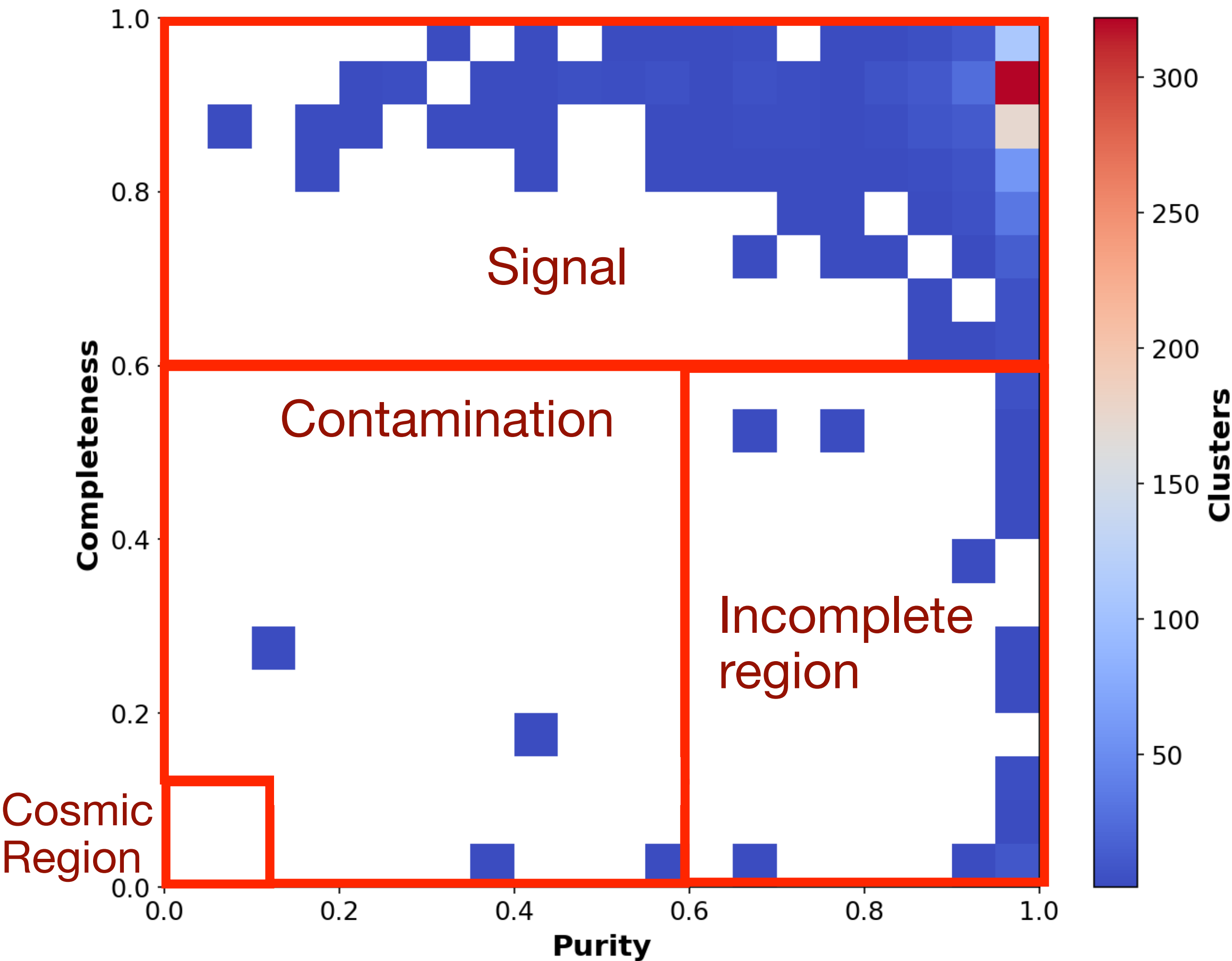
Selected Reconstructed Clusters

Number of Files	100
Events	1000



Reconstruction Accuracy

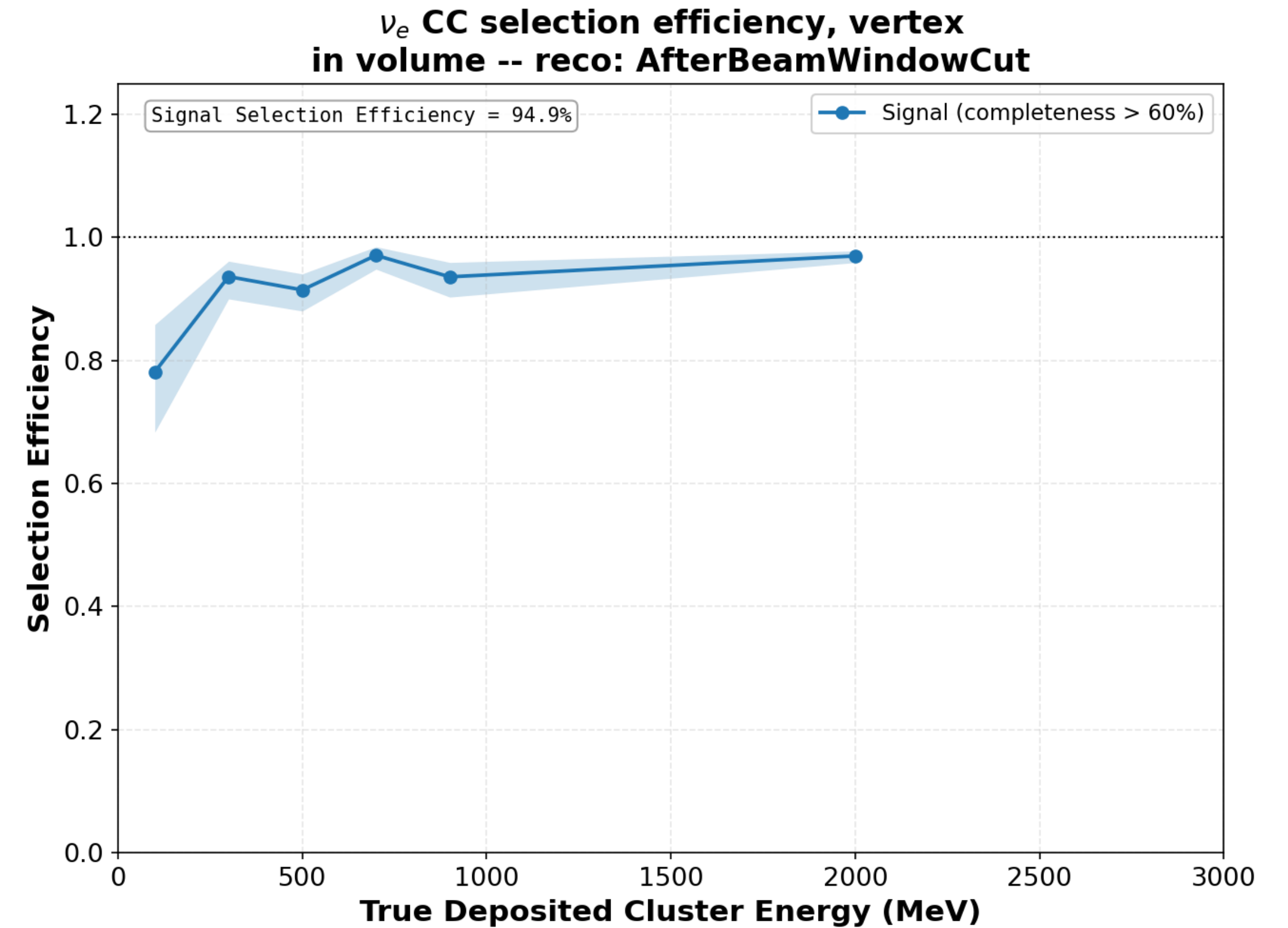
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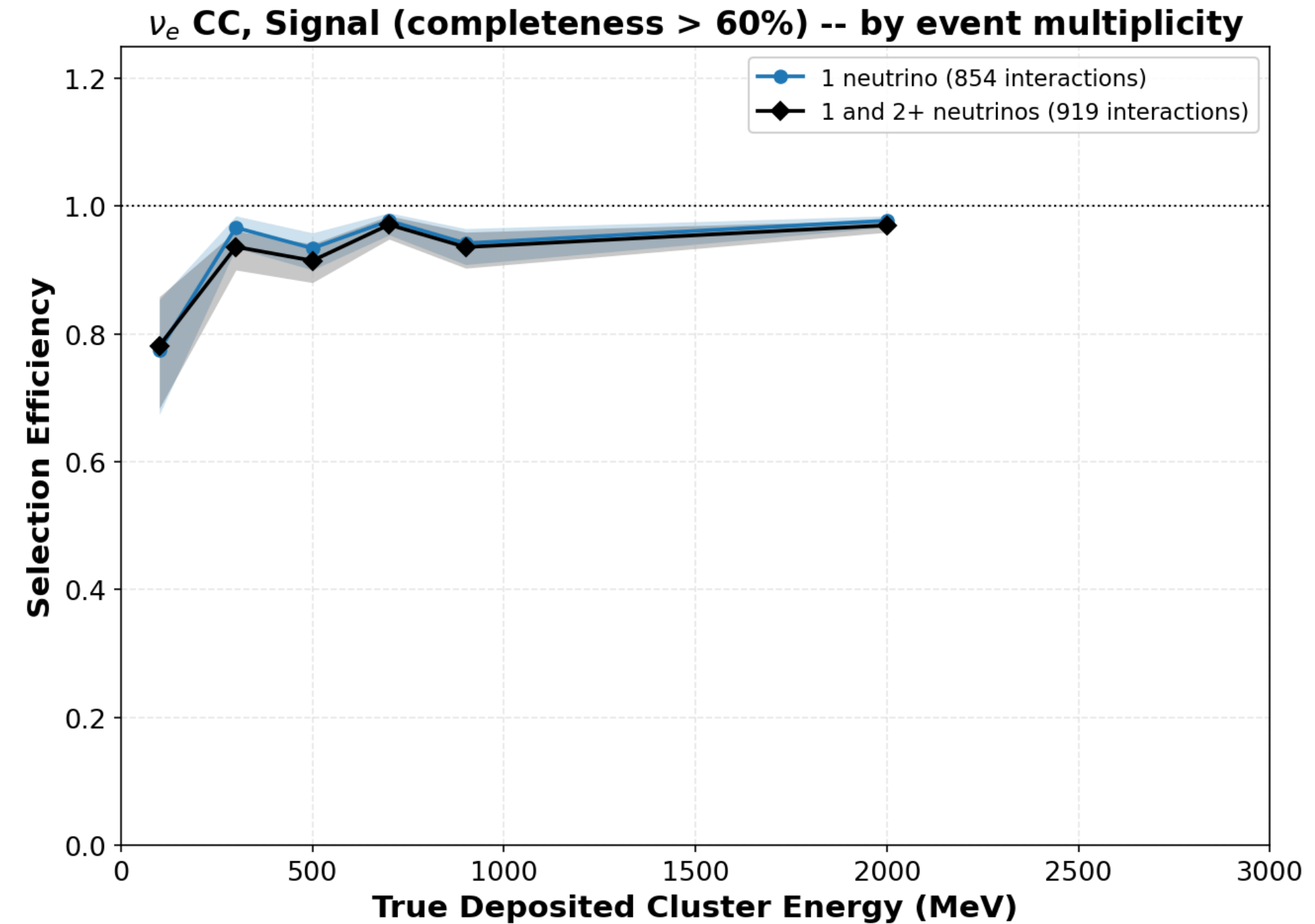
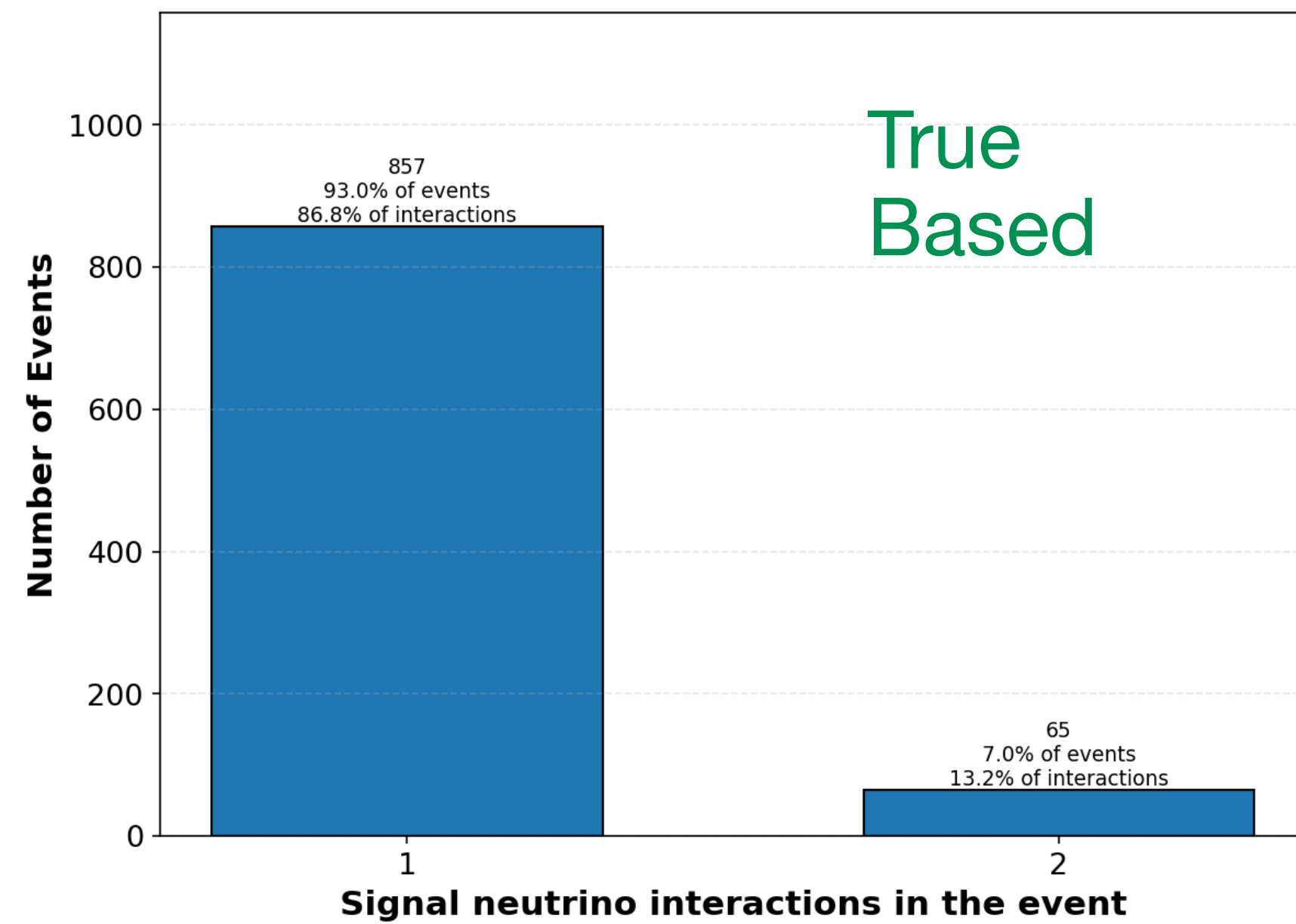
Selection Efficiency

$$\epsilon = \frac{\text{Selected } \nu_{\mu} CC \text{ in-vol in good reconstruction area}}{\text{true in-volume } \nu_{\mu} CC \text{ neutrinos}}$$

- Selection efficiency is high $\sim 95\%$

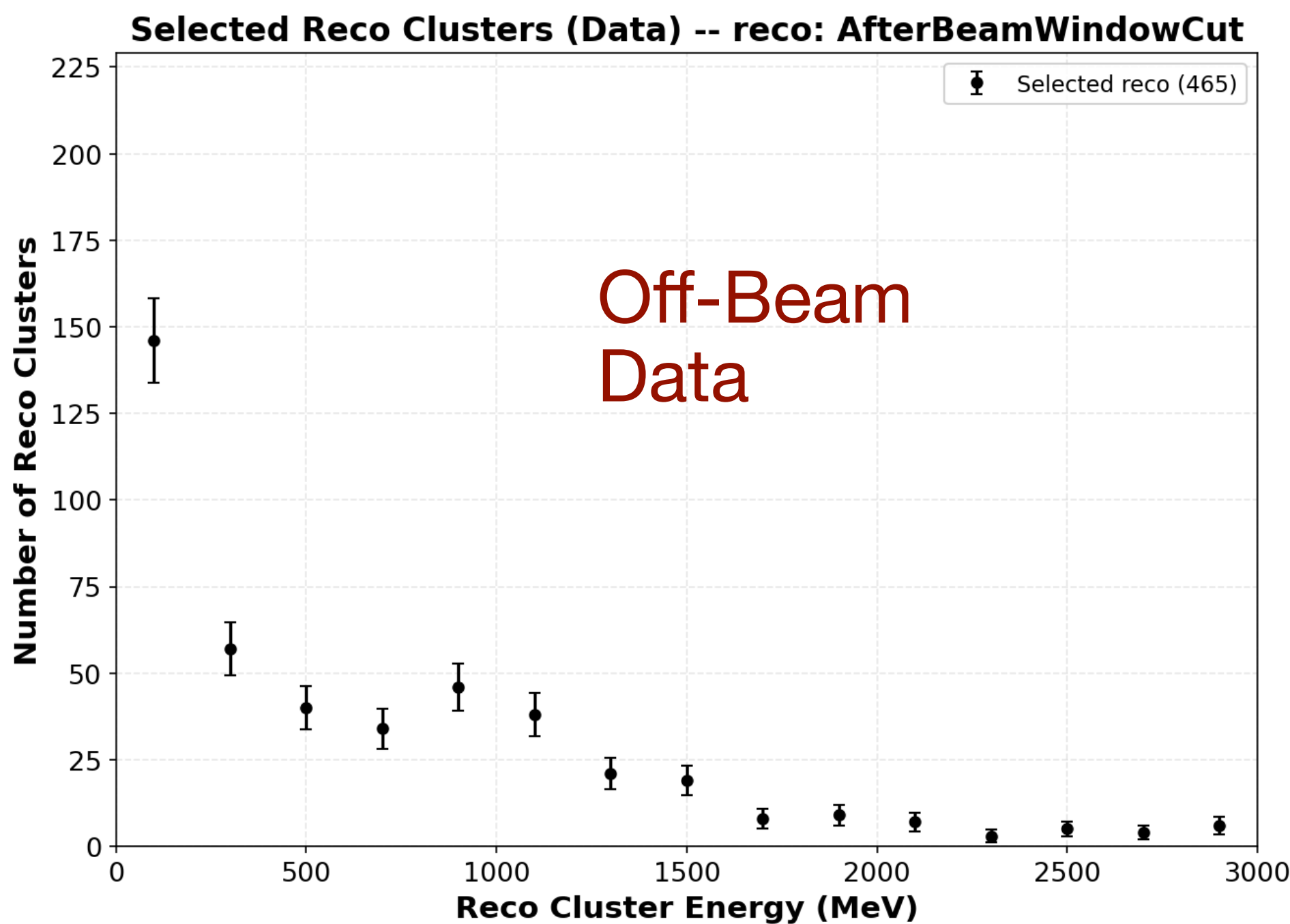
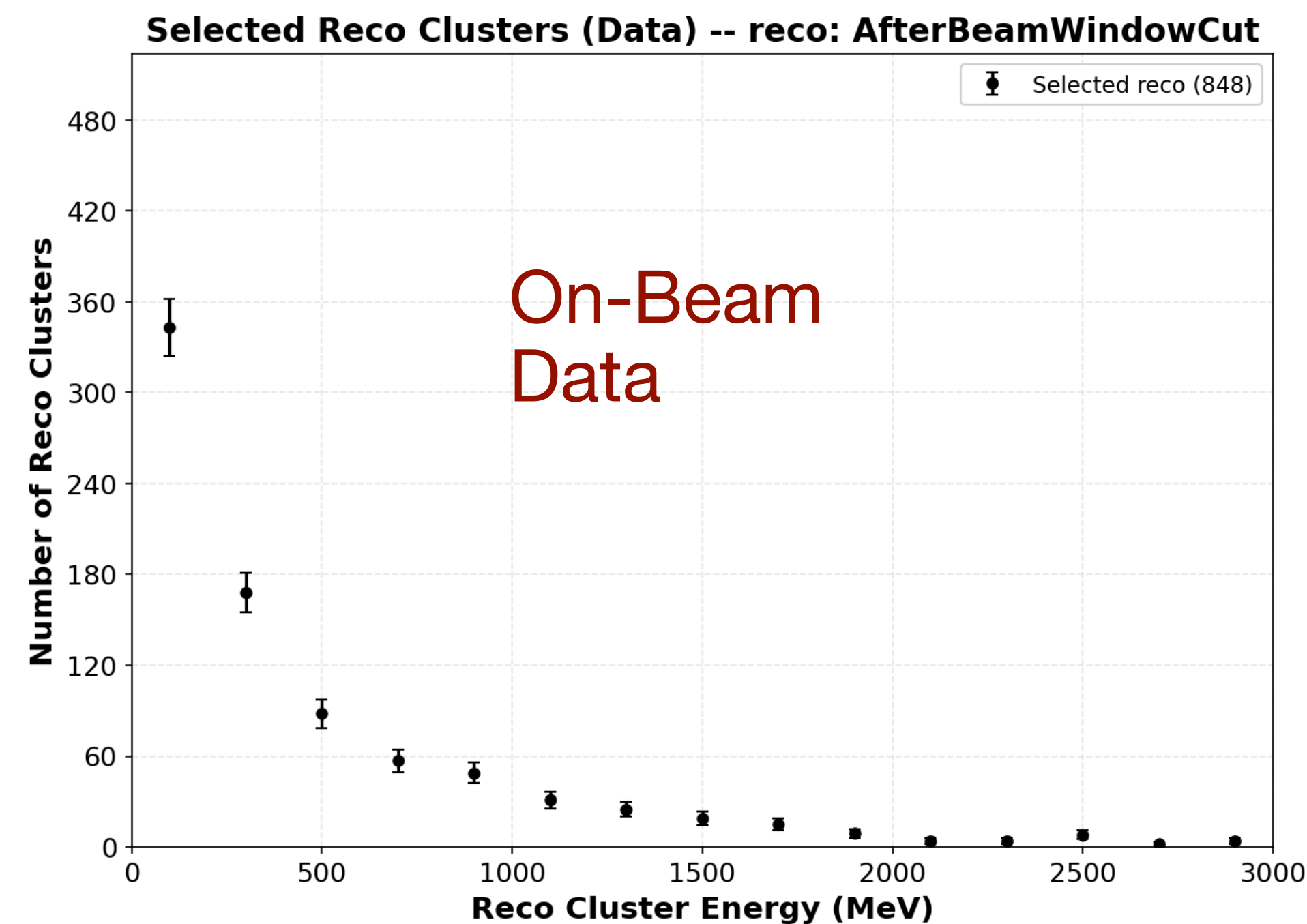


Does Pileup Affects Selection Efficiency?

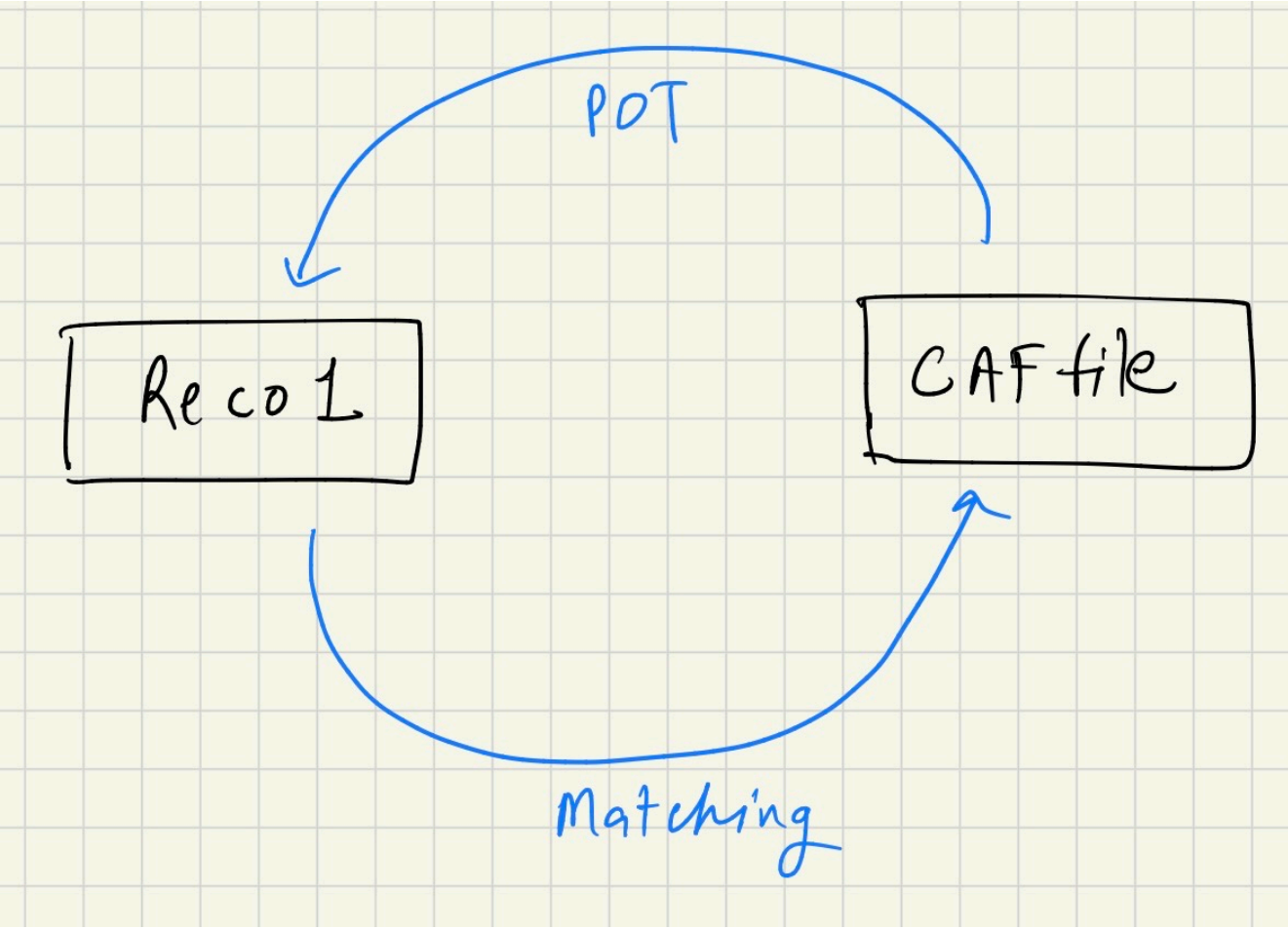


- Pile up events due to 2 or more in-volume neutrinos have little impact on the selection efficiency
- Wirecell reconstruction is robust against multi-neutrino events

Off- and On-Beam Data: Before Cosmic Tagger



- Currently Working on POT estimation



Also explain impact of Cosmic Tagger on off-beam data

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