

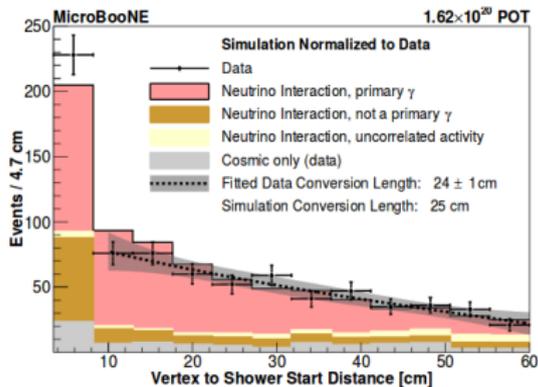
GENIE in MicroBooNE



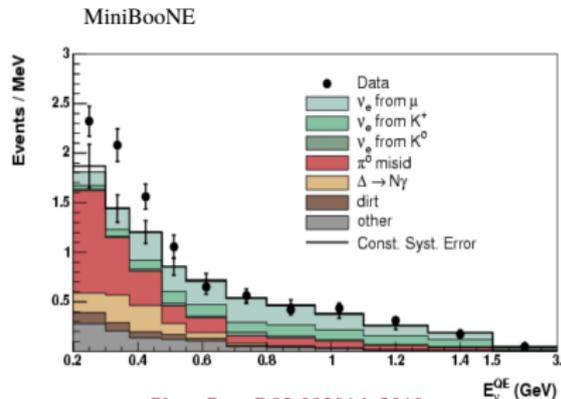
A.Papadopoulou & S.Gardiner
GENIE Forum
January 16, 2019

How does μ BooNE use GENIE?

- Estimation of beam-related backgrounds
- Selection efficiencies
 - ▶ Reconstruction is topologically dependent!
- Interpreting results of new physics searches
 - ▶ Are our results consistent with MiniBooNE's low-energy excess?
- Some detector effects are studied using GENIE to tune selection
 - ▶ Example: maximize final-state protons to study high dE/dx response



arXiv:1811.02700



Phys. Rev. D82:093016, 2010

GENIE versions for μ BooNE production

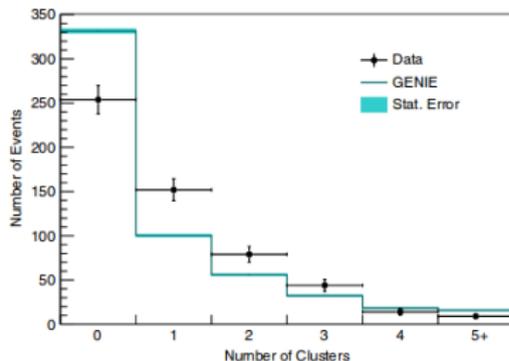
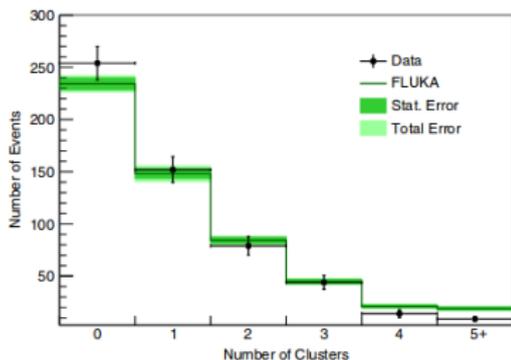
- Most recent MC production (“MCC8”) used GENIE v2.12.2:
 - ▶ “Tune 1”: default + empirical MEC
 - ▶ “Tune 3”: ValenciaQE BergerSehgalCOHRES
- MCC9 production will start soon
 - ▶ GENIE v3.0.2, likely with the G18_10a_02_11a tune
 - ▶ Expected to be used for more than a year
 - ▶ MCC10 might be an SBN-wide effort
- Migration to v3 still in progress, will have more feedback later
 - ▶ First GENIE-v3-ready LArSoft test release (v8_01_00_01) recently tagged
 - ▶ Validation in progress
 - ▶ Some Reweight calculators should be revisited
 - Cannot assume that the historical default tune was used

MicroBooNE's future GENIE needs

- Reweight-based systematics studies are performed by analyzers after production
 - ▶ Continuing interest in the “latest & greatest” Reweight version
 - ▶ Backward compatibility with samples generated using v3.0.2 important
- For bug fixes after v3.0.2, achieving the same effect via Reweight is highly desirable
- Greater transparency about parameter uncertainties helpful
 - ▶ Where did the 1-sigma uncertainties for the Reweight tweak dials come from?
 - ▶ Aren't they tune-dependent? If so, can that information be made available for all the standard tunes?

A request: low-energy de-excitations in GENIE

ArgoNeuT



Multiple MicroBooNE collaborators are interested in pursuing an analysis of neutrino-induced low-energy activity.

ArgoNeuT recently published about this, but they had to use FLUKA because GENIE lacks a low-energy de-excitation model.

Finishing the INCL++/ABLA07 interface under development for GENIE would allow this work to proceed.



Thank you!

