Osc Group Update

Bryce and Georgia
10/10/2014

- David Kaleko, DocDB 3640

  - Generate single uB e/ɣ MC dataset based on published final uBooNE results

  - Run through a truth-based event selection

  - Stack new excess prediction on updated uB backgrounds, which have gone through the same selection
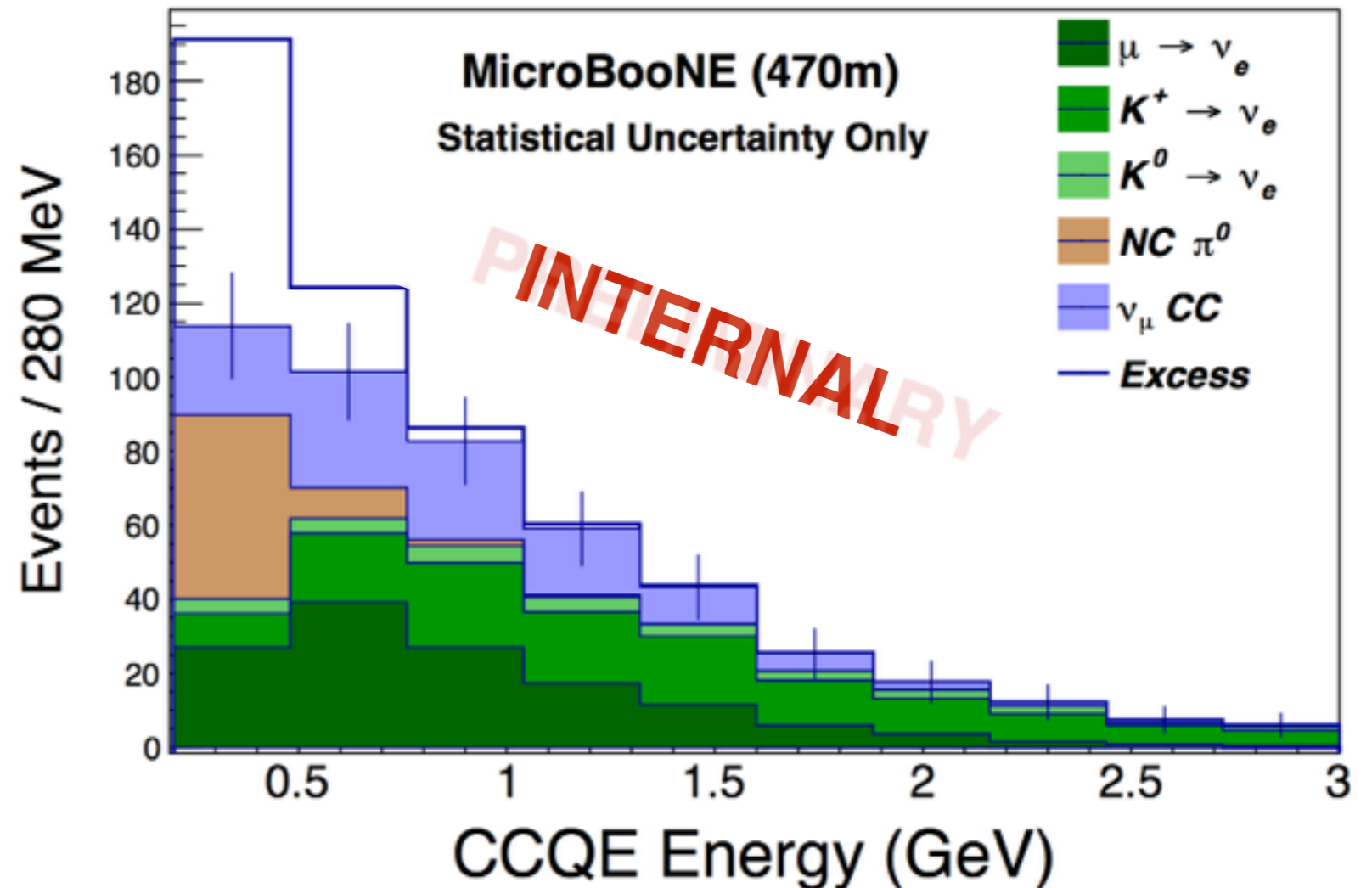
Stat significance: Signal/sqrt(bkgrd) in the first bin is 75/sqrt(117), which is 6.9 sigma
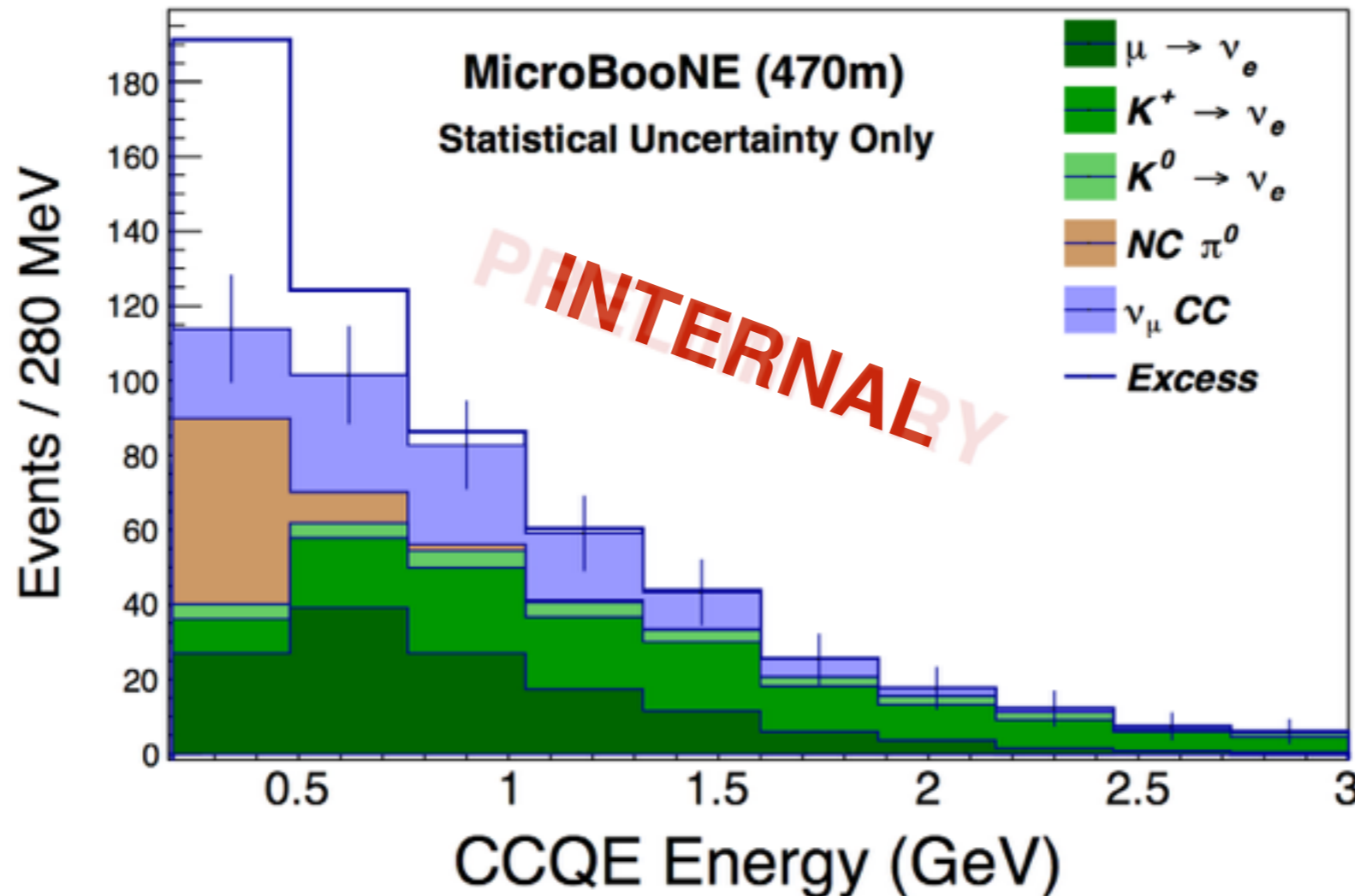Signal/sqrt(bkgrd) for the first 2 bins combined is 6.7 sigma

Improvements, Extensions

Nue app Improvements

| Missing a background: cosmics | Missing a background: dirt (Beam WG) | Use Reconstructed MC; not truth! |

MicroBooNE (470m)
Statistical Uncertainty Only

Legend:
- $\mu \rightarrow \nu_e$
- $K^+ \rightarrow \nu_e$
- $K^0 \rightarrow \nu_e$
- NC π^0
- ν_μ CC
- Excess

INTERNAL

Events / 280 MeV vs CCQE Energy (GeV)

Stat significance: Signal/sqrt(bkgrd) in the first bin is 75/sqrt(117), which is 6.9 sigma
Signal/sqrt(bkgrd) for the first 2 bins combined is 6.7 sigma

Osc Extensions

| Define nearer-term sensitivity, if any? | Progress on other actively-pursued app/dis analyses? | What if excess is gamma-like? |

Adding Cosmic Background

- September: add cosmic bkgs to these plots

  - Done with Christoph's CRY-based estimates of primary cosmic gammas

- We now know that uB backgrounds will likely not be primary gammas, but secondaries

  - Plan to re-do these calculations with guidance from cosmics task force

- Working on making similar plots for gamma-like excess

Georgia, Cristoph, Andrzej, David K, Corey
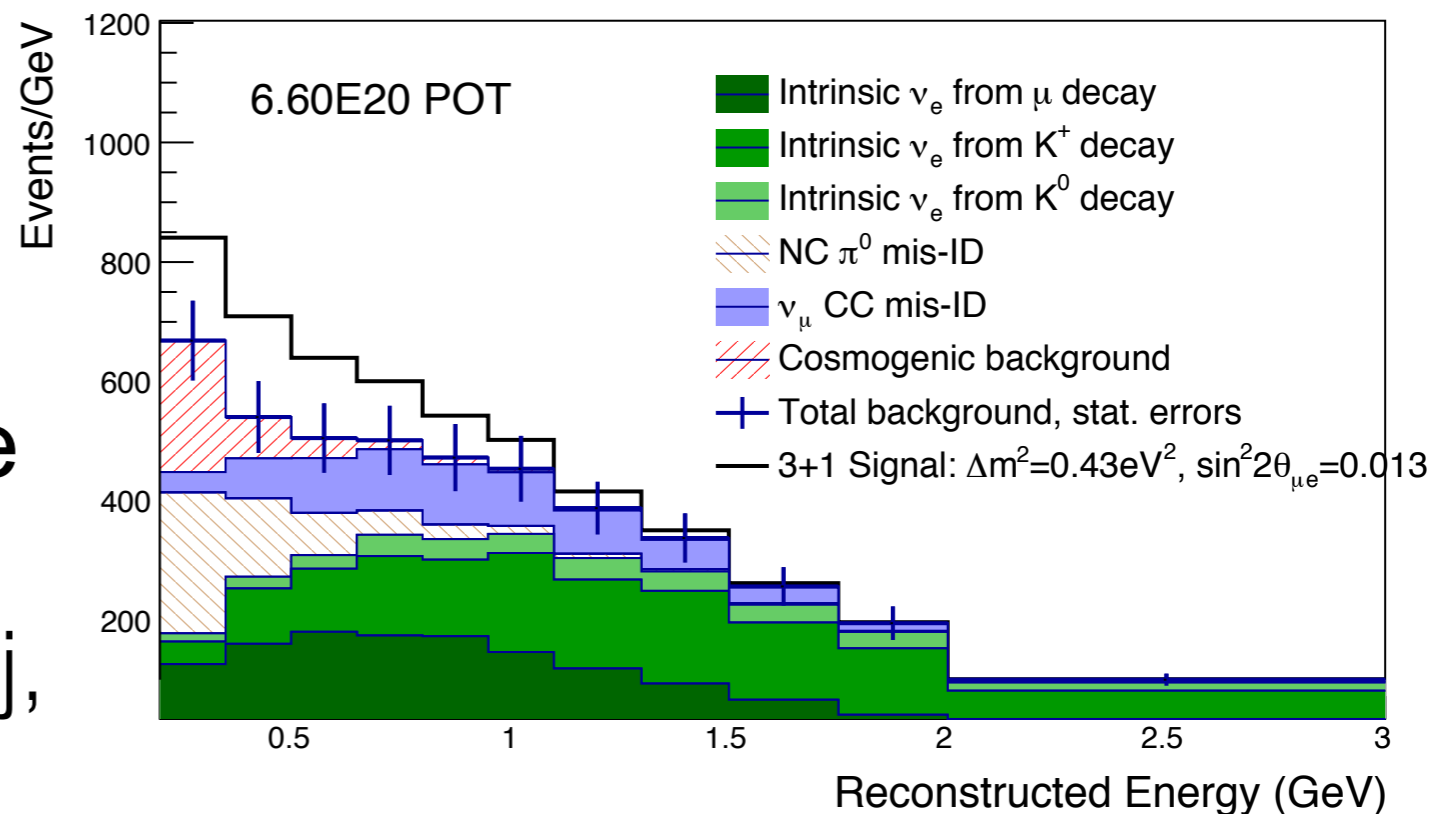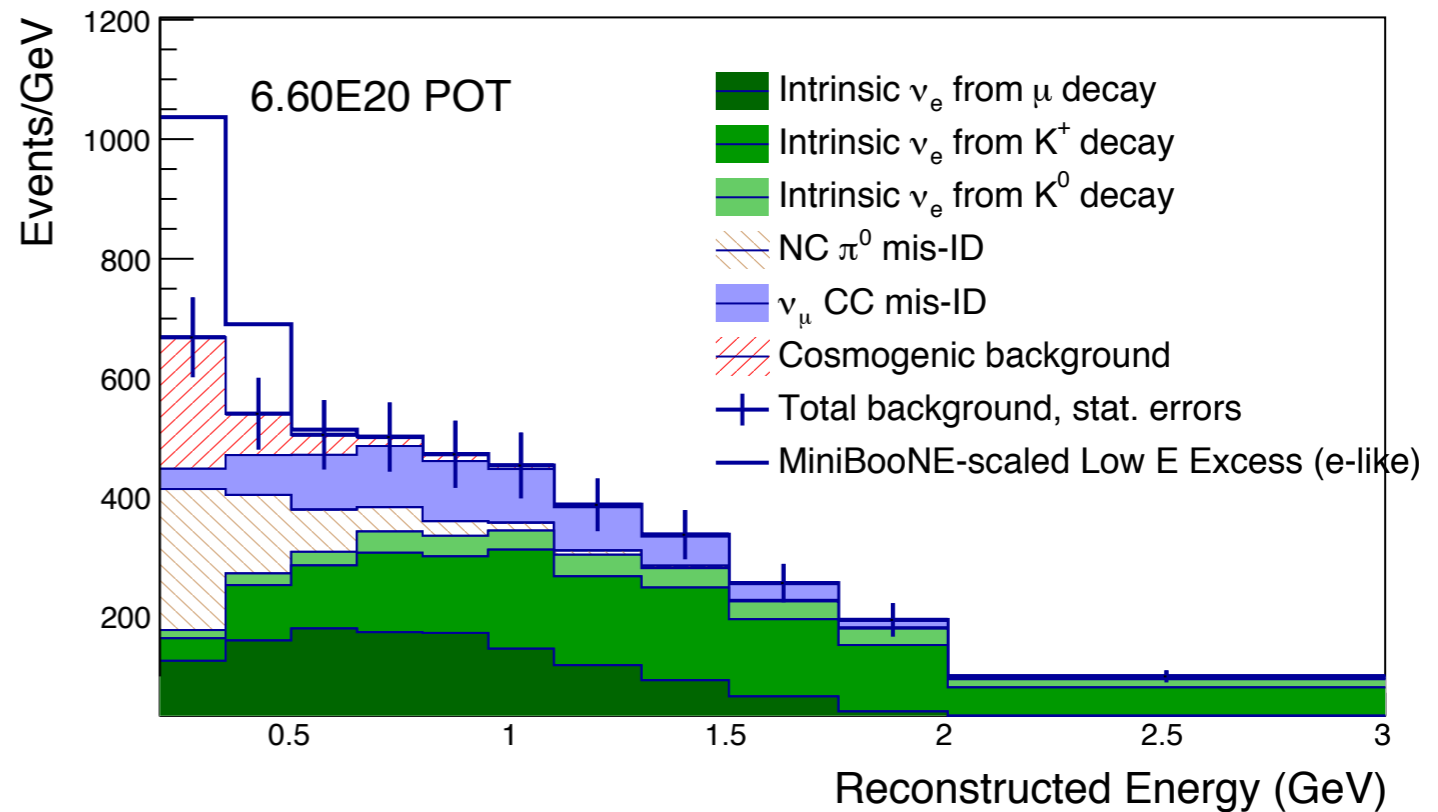
Nearer-Term Sensitivity

- Have plots defining the e-like excess for a few models, given 0.5e20 POT

  - Defines what e-like excess measurement significance might be in the short-term

- Plots made by Georgia, using bkg inputs from Corey and Christoph
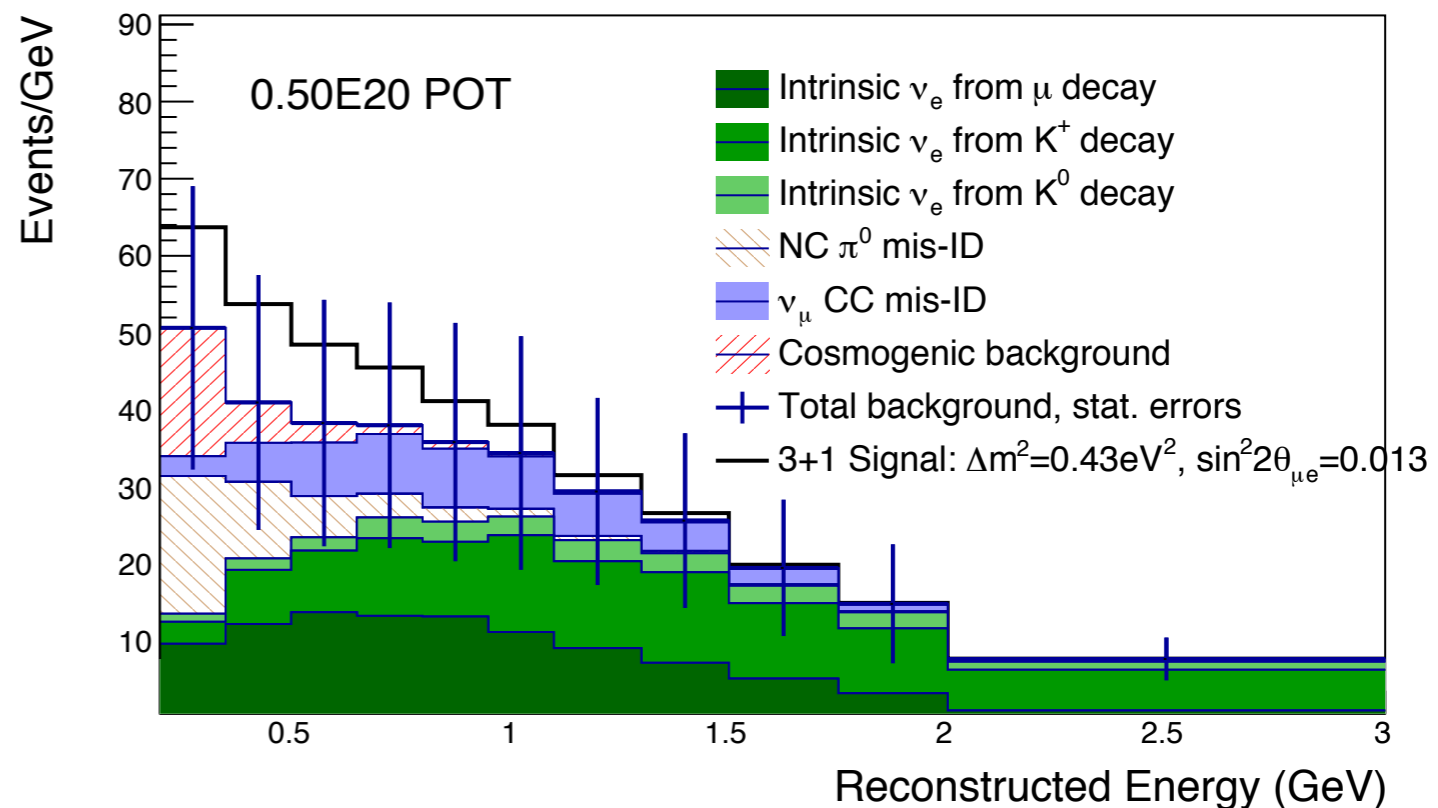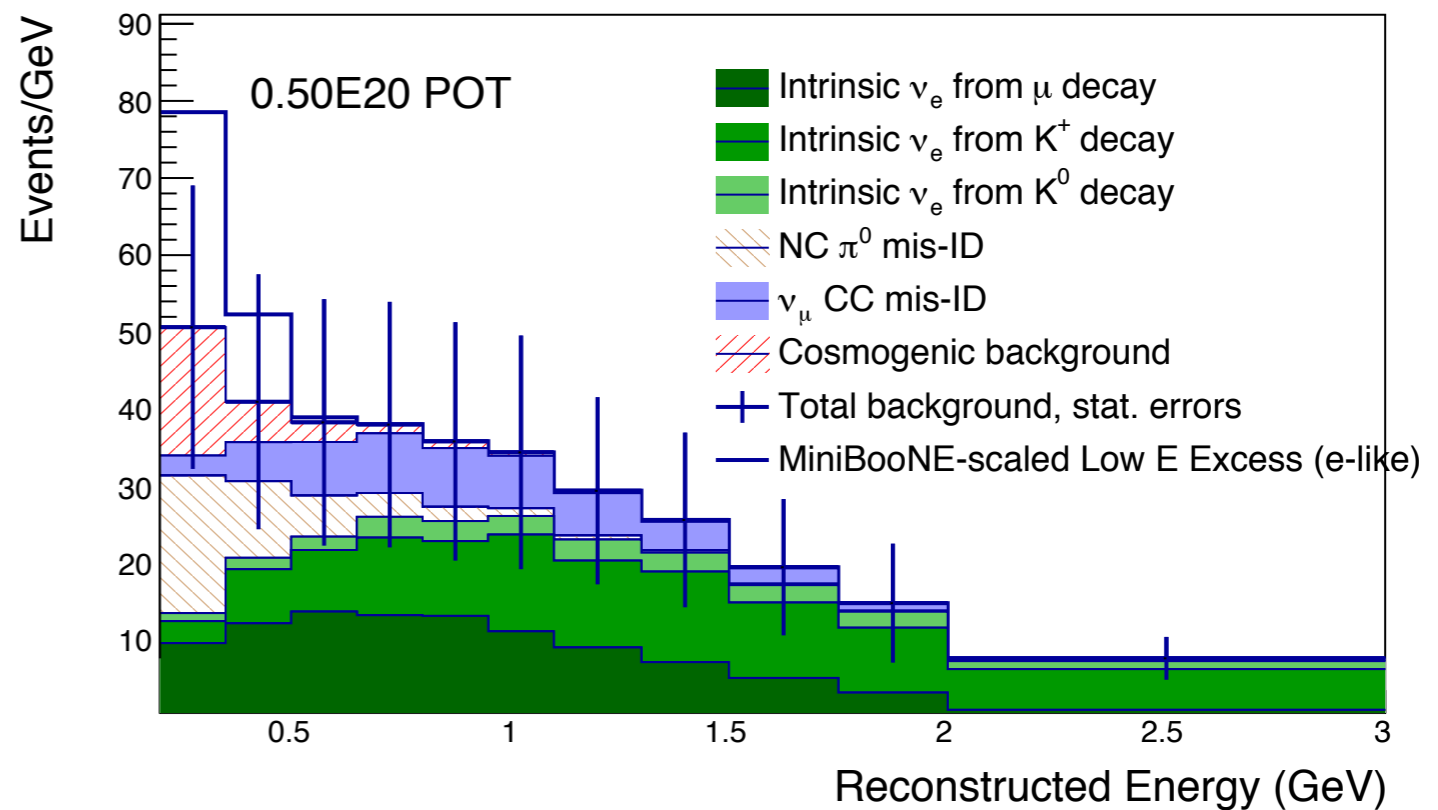
Georgia, Cristoph, Andrzej, David K, Corey

Use Reconstruction!

- ## As previously mentioned, major advances in shower reco

  - Shower direction, momentum reconstruction getting advanced enough to produce Pi0 mass peaks from single generated Pi0's.
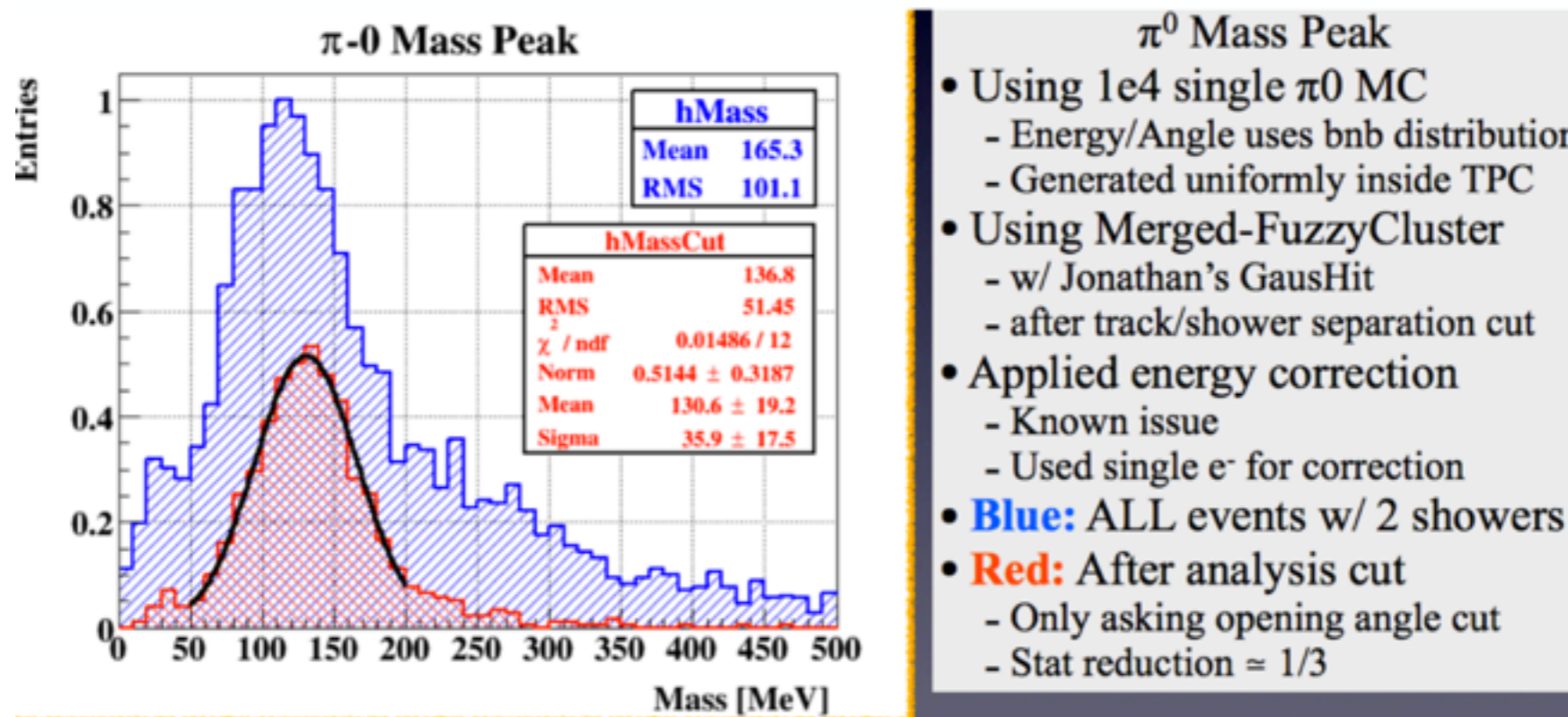
  - Have discussed viability of producing single-shower reco efficiencies and gamma and numucc mis-ids with shower reco experts

  - Getting closer to proof-of-principle reco-based efficiency, mis-id numbers

  - If Osc folks are interested in digging into reco for e-like efficiencies, numucc mis-id, see Kazu, etc!

Kazu, Andrjez, David K, David C, Ryan, Ariana, Corey, others!
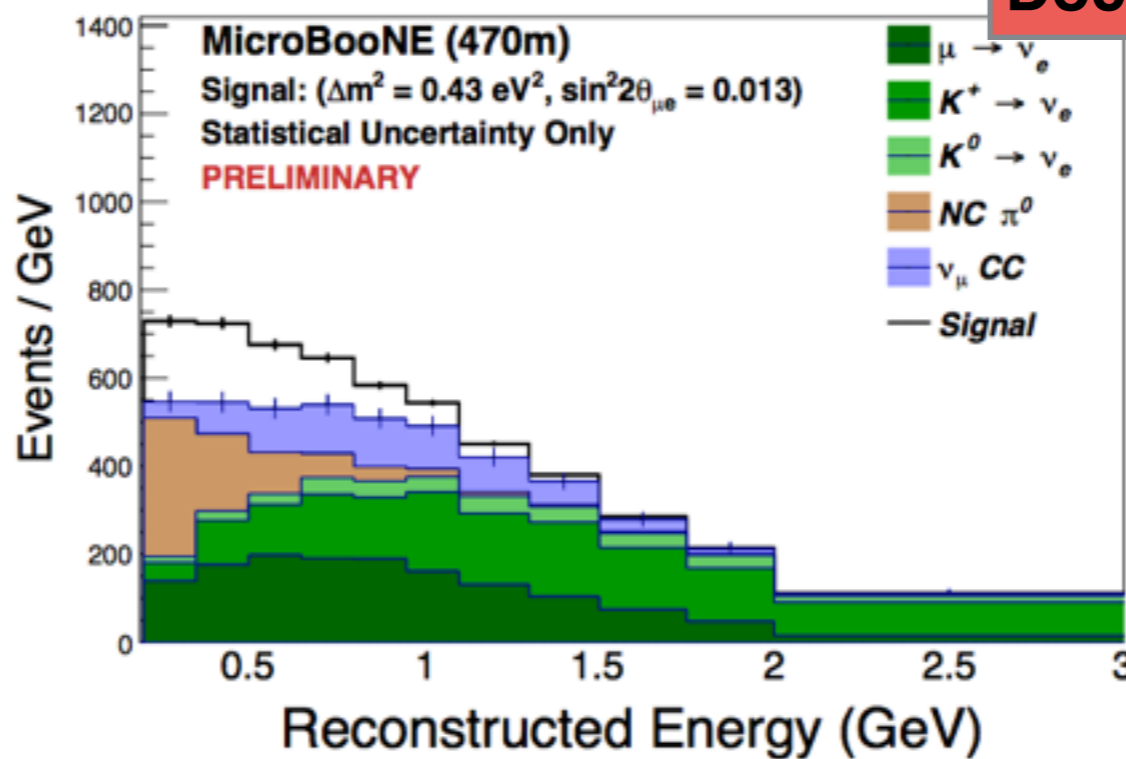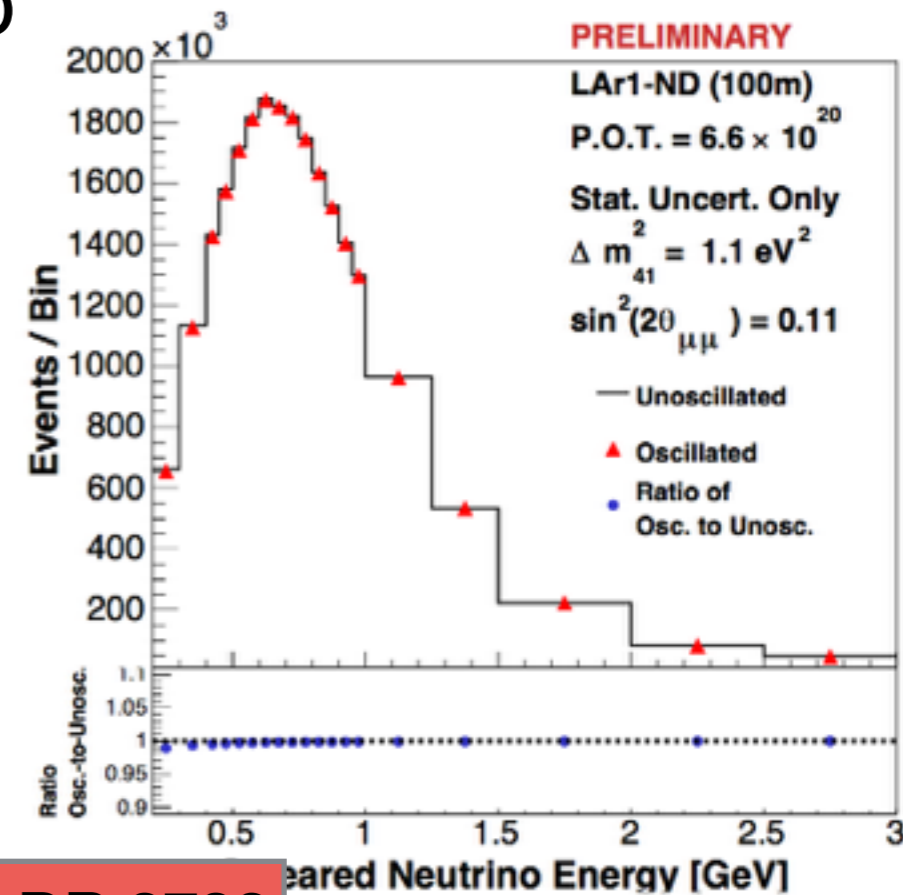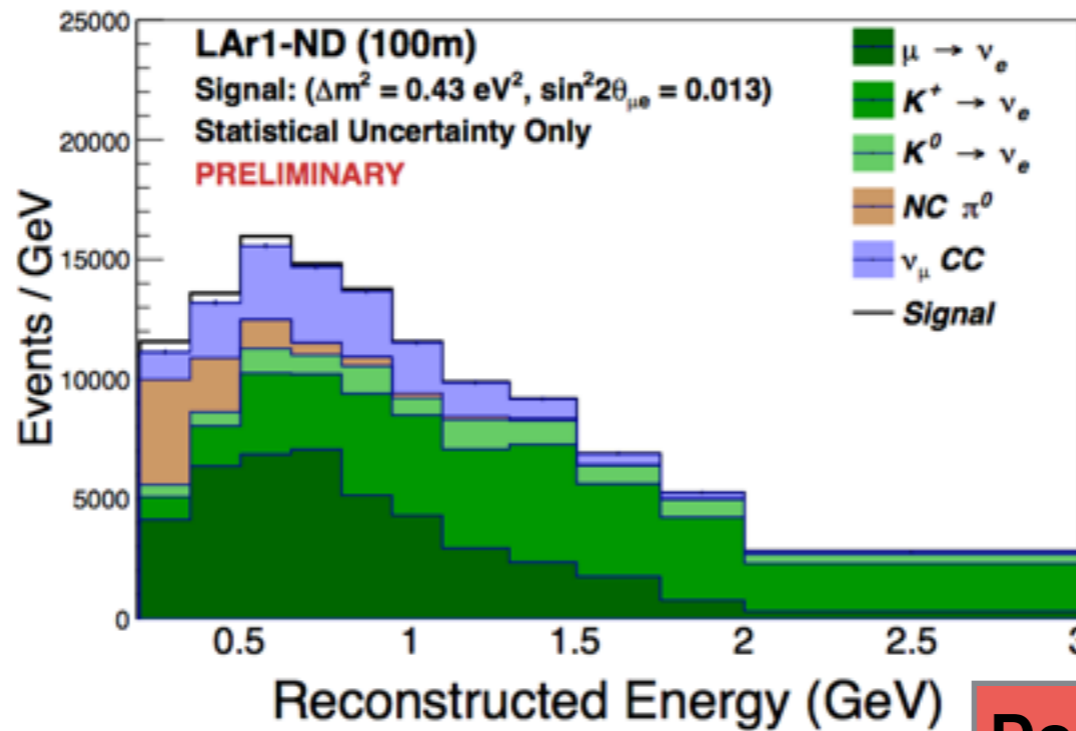
Other App/Dis measurements?

- New tech-note detailing numu dis, nue app from SBL physics folks: relevant to uB osc

  - Gives 3+1 sensitivities for different analyses for uB-only, uB+LAr1-ND, Full SBL
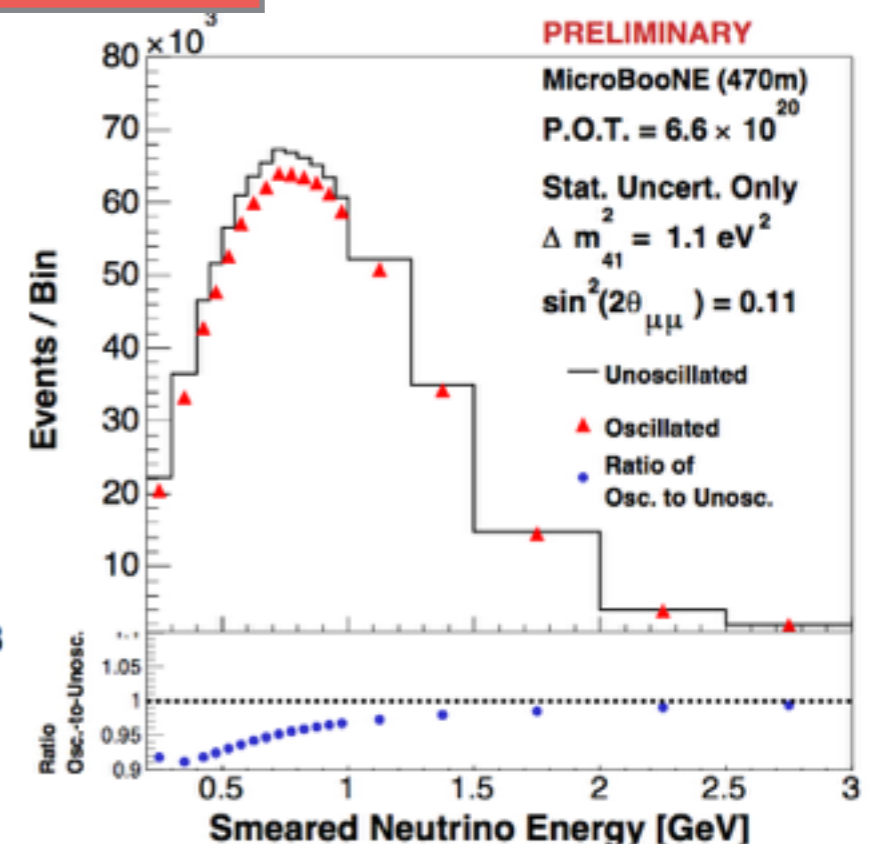
  - Significant work on x-section uncertainties underway

  - Please give feedback on TechNote!

  - Also looking at signal injection plots (Davio)

DocDB 3732

Corey, Joseph

Thanks!