DEEP UNDERGROUND NEUTRINO EXPERIMENT

UNIVERSITY of HOUSTON
YOU ARE THE PRIDE
DEPARTMENT OF PHYSICS

Updated on Electron Energy Reconstruction

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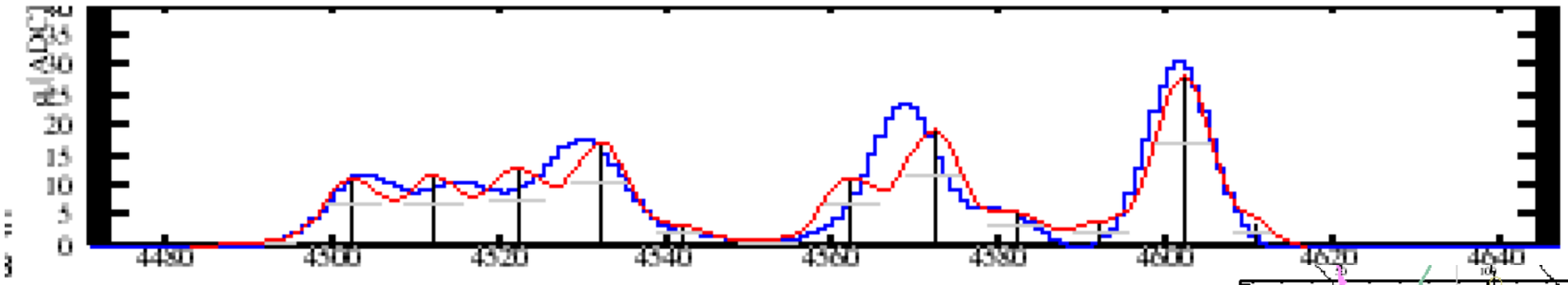
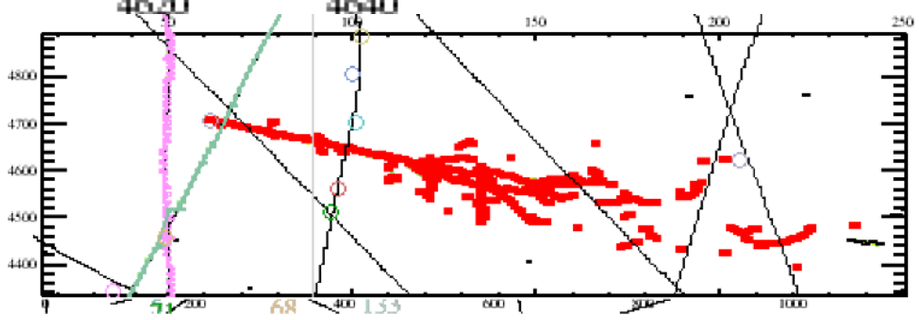
Energy Reconstruction

Fitting multiple gaussians to a long pulse is just an approximation
An alternative would be use recob::Wire signals and sum up the ADC





Using single electrons 1GeV to compare charge on recob::Wire vs recob::Hit

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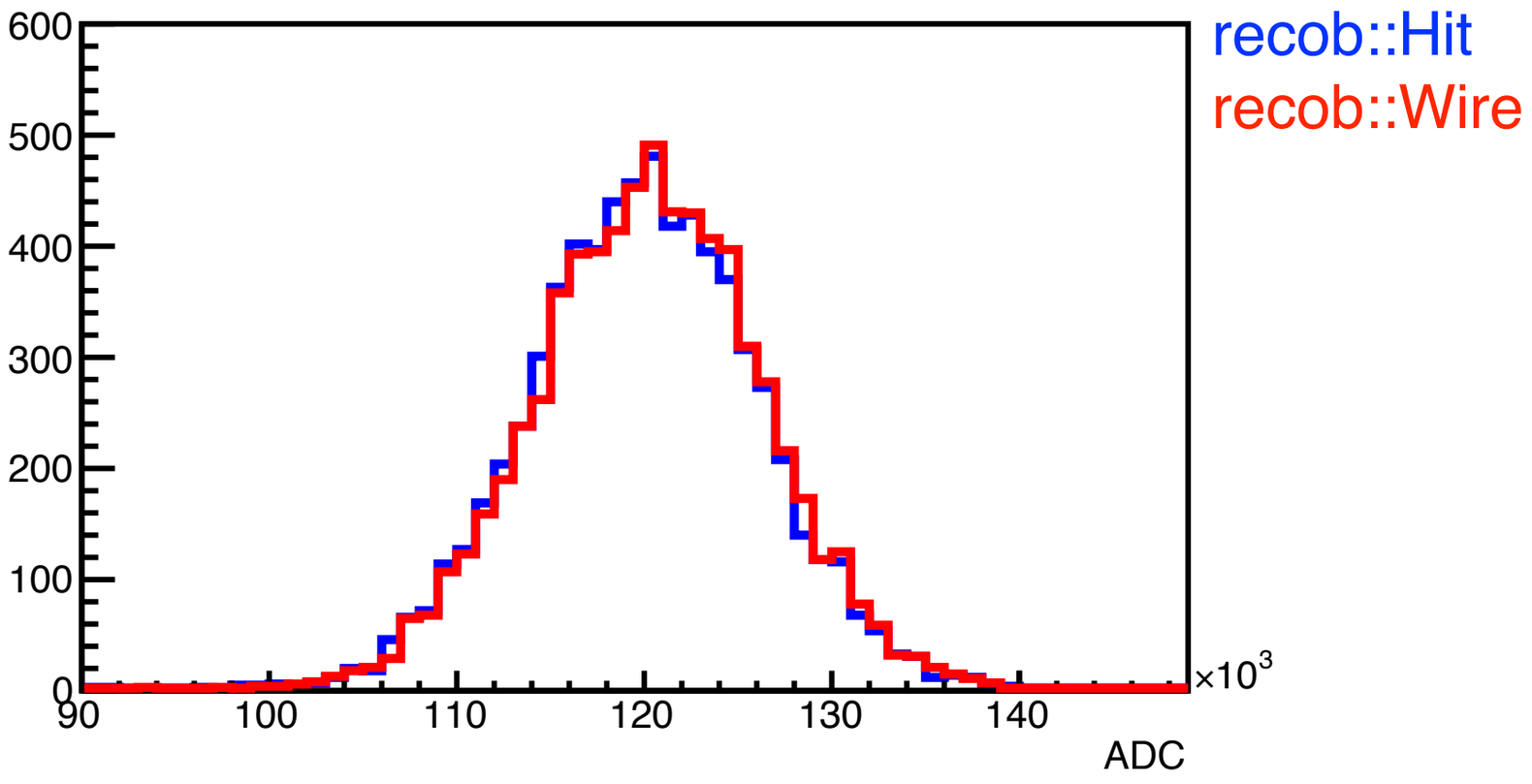
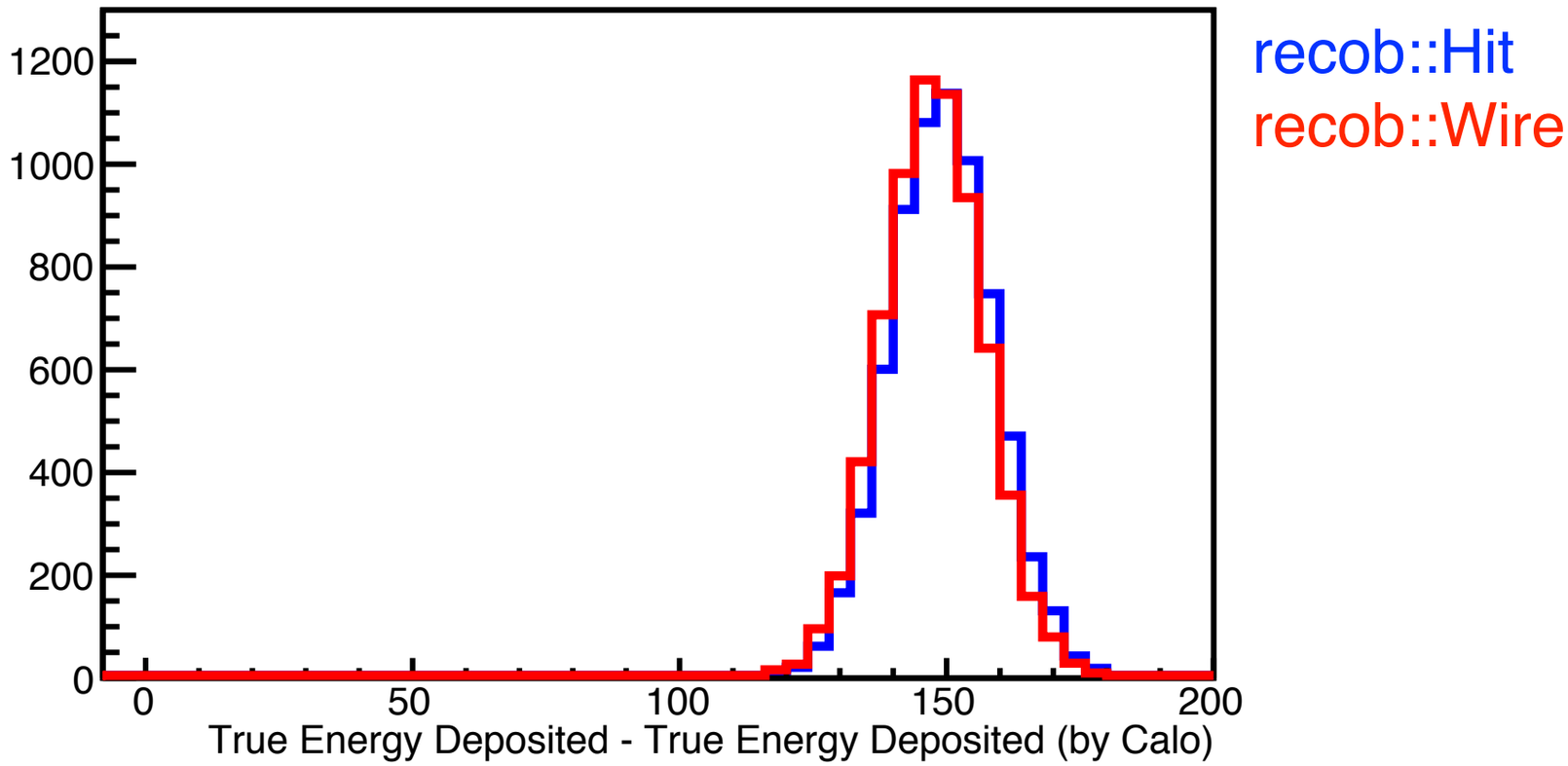


Energy Reconstruction

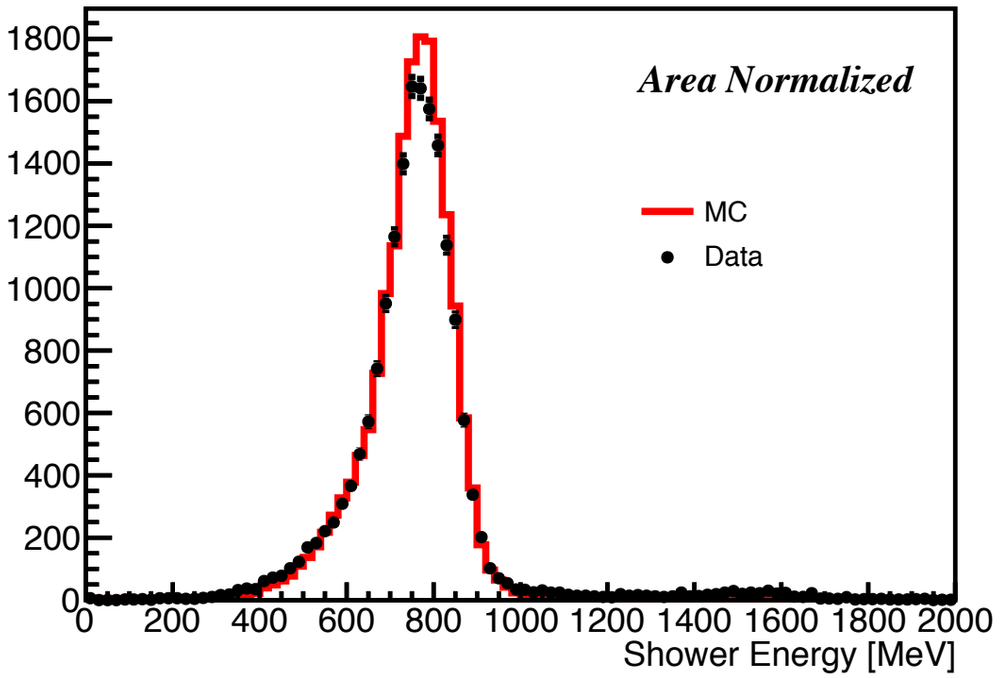
Fitting multiple gaussians to a long pulse is just an approximation
Use recob::Wire signals and sum up the ADC
Sample single electrons 1GeV to compare charge on recob::Wire vs recob::Hit

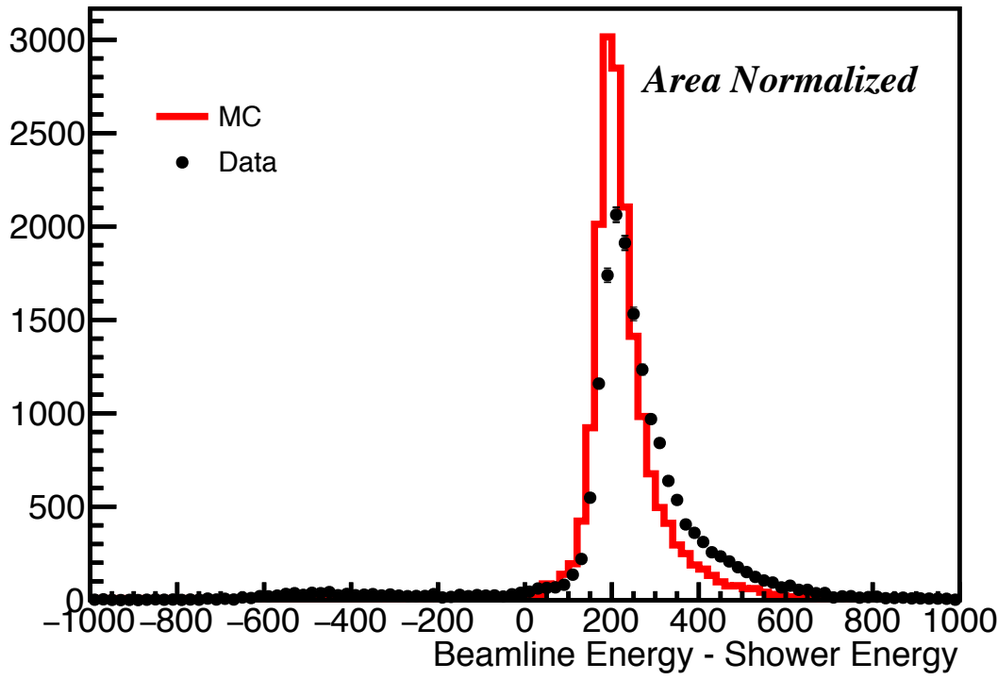


Bias is quite large ~148 MeV, we would do a double check
Are there many too soft energy deposition? Look at individual sim::IDE energy

recombination factor = 0.7

Energy Reconstruction





- We understand better where the bias is coming from in the energy reconstruction
  - Upstream energy loss according to simulation is ~18 MeV according to beam experts is ~50 MeV
  - Signal processing ~148 MeV

recombination factor = 0.7

Energy Reconstruction

- We understand better where the bias is coming from in the energy reconstruction
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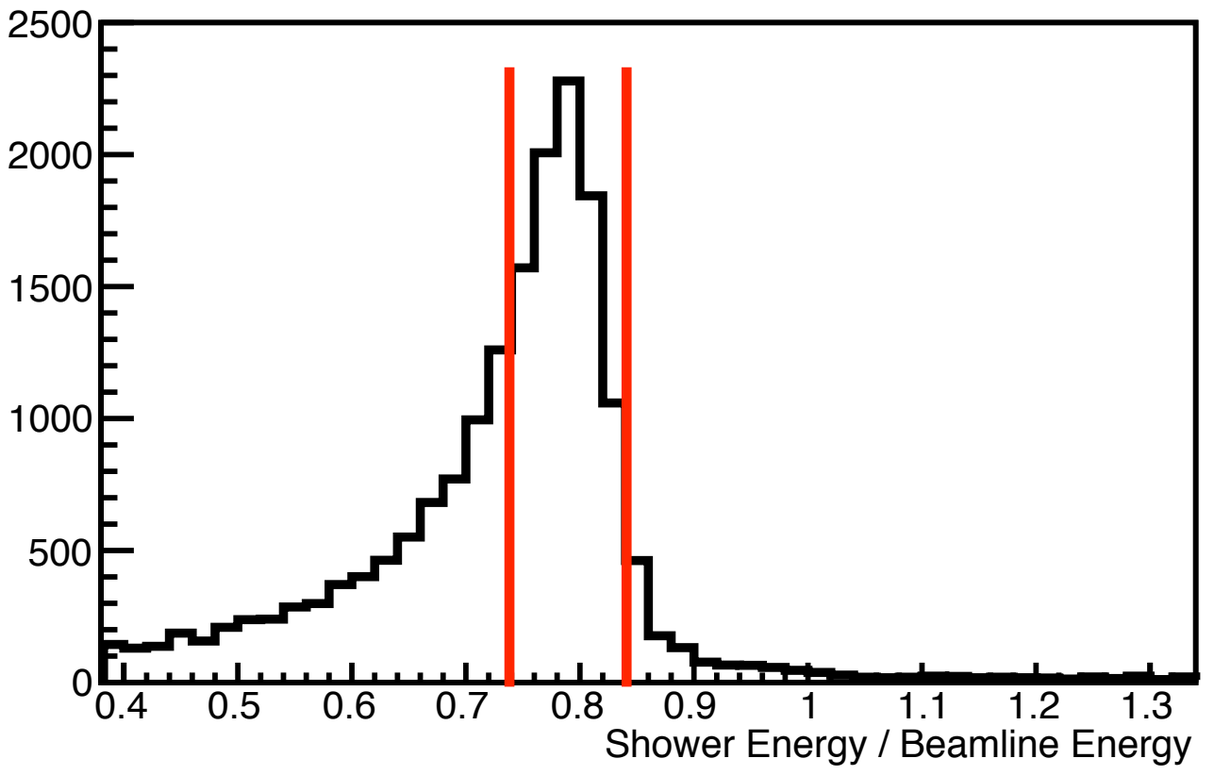
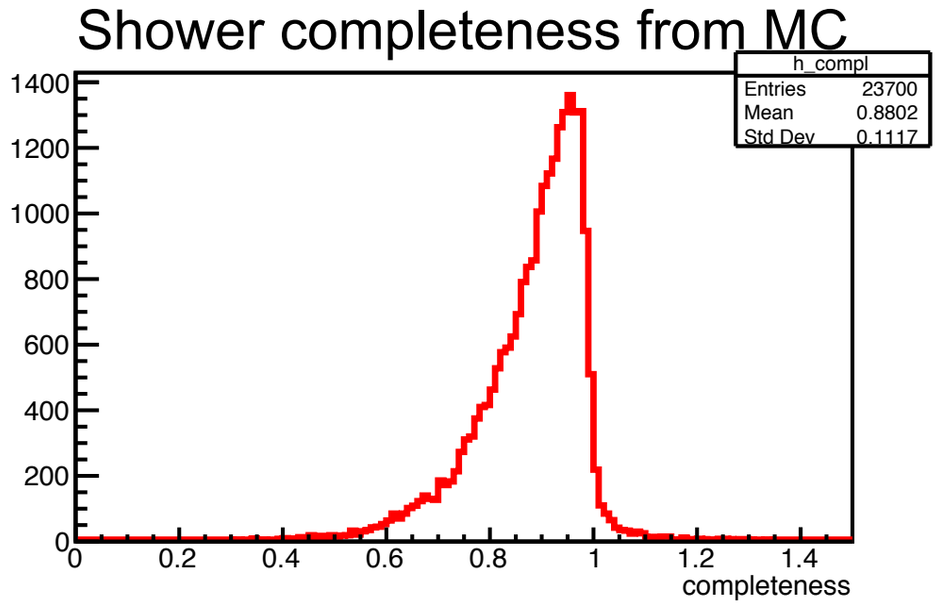
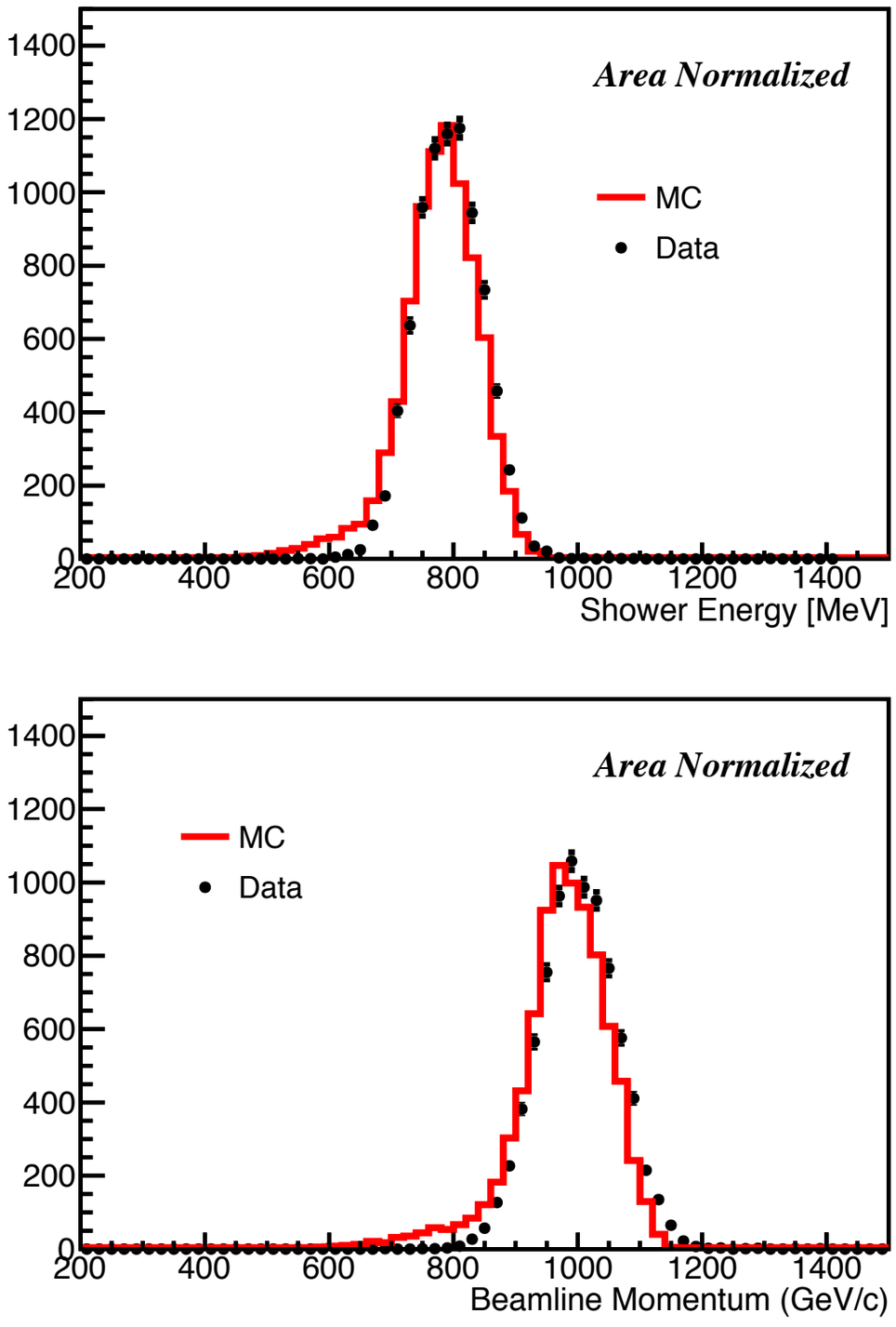
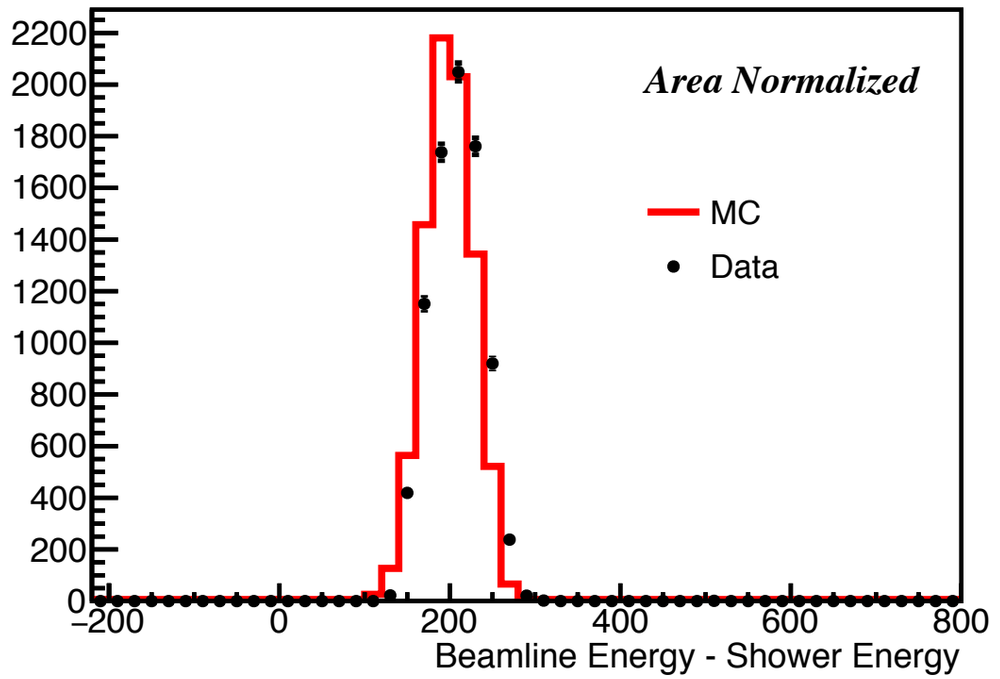




Focus on complete showers

Energy Reconstruction





- Still there is small difference between data and MC
- Data looks better than MC though

recombination factor = 0.7

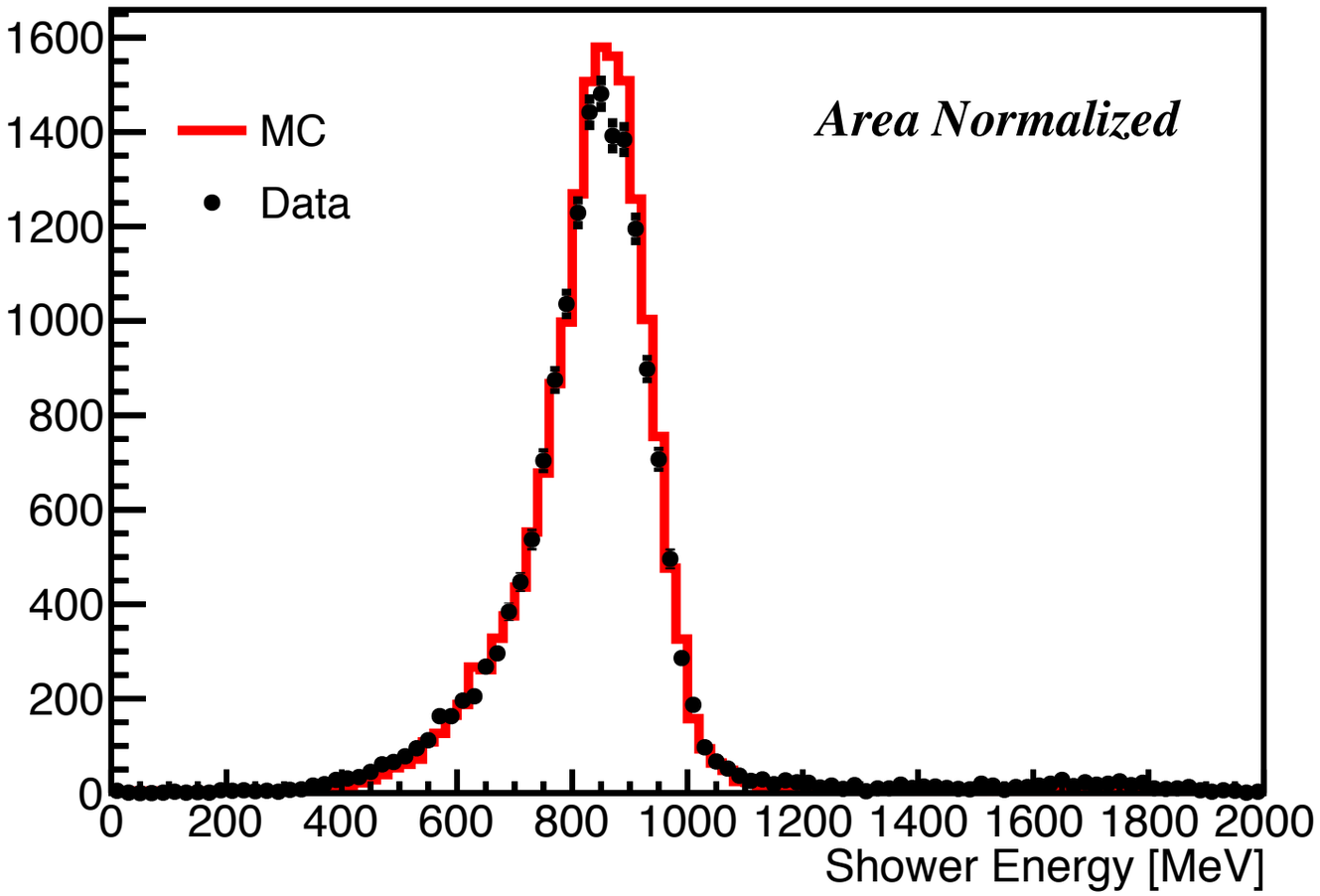
Summary

- We understand better the shower energy reconstruction

The End

Energy Reconstruction

$$E_{calo} = \sum_{i=1}^{i=N\ \ hits} \frac{\epsilon_i(X,YZ) dQ_i W_{ion}}{calorimetry\ \ factor \cdot Recombination\ \ factor}$$



- epsilon_{i} = correction factor X(life time) and YZ(wire response, etc.) run 5809
- dQ_{i} = hit charge
- W_{ion} = 23.6e-6, from Argoneut
- calorimetry factor = 5.58e-3 run 5809
- Recombination factor = 0.63, from FERMILAB-PUB-15-458-ND