



Energy Smearing

Fanny Dufour, June 16th, 2006



Outline

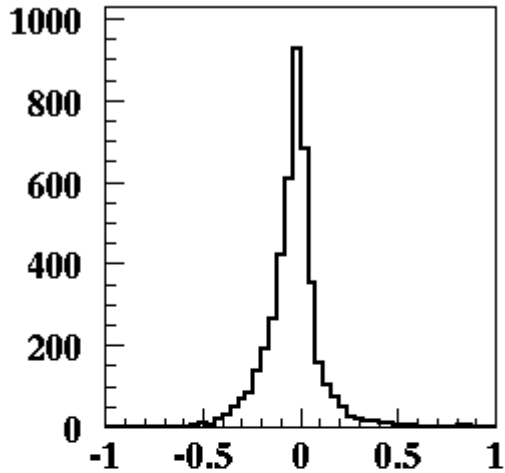
Note: this talk is not finalized, feel free to email me with questions and comments!!

- Basic energy distributions $(E_{\text{rec}} - E_{\text{true}})/E$
- Event by event method
- Spectrum method

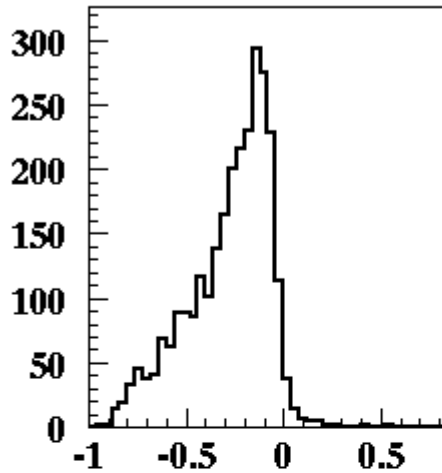
$(E_{\text{rec}} - E_{\text{true}}) / E_{\text{true}}$

Split according to E-true only
CC events

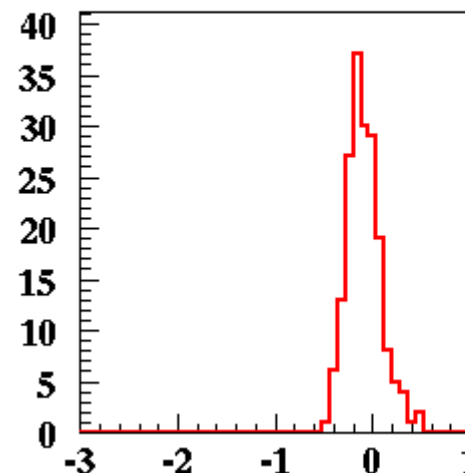
— CCQE events



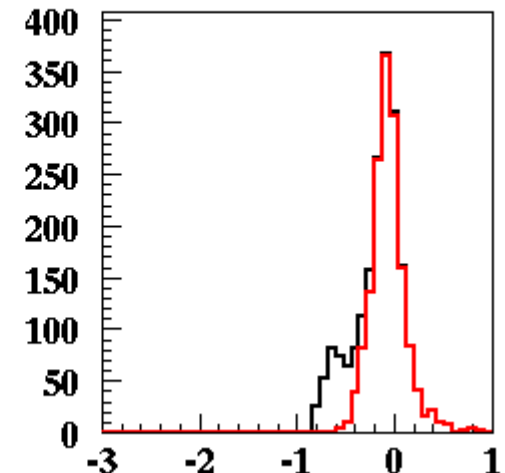
CCQE



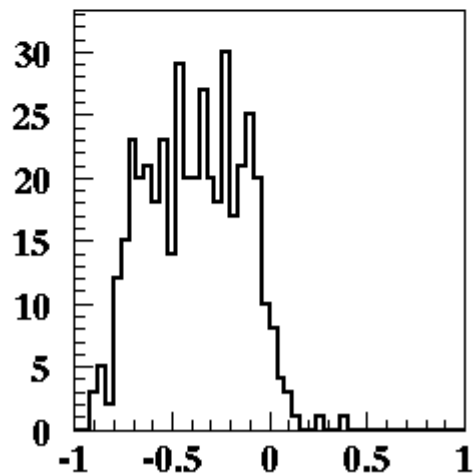
NUC CC



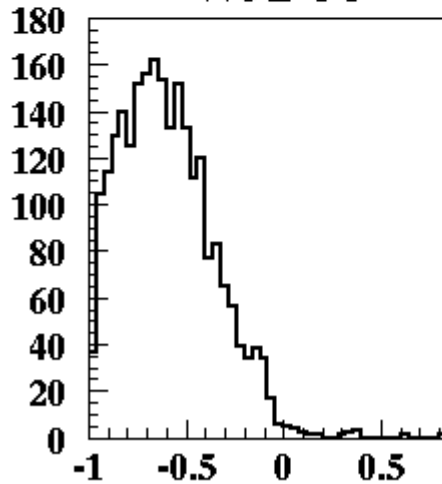
E 0.35



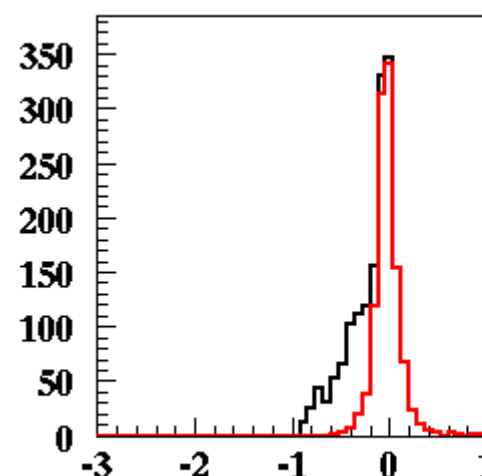
0.35 E 0.85



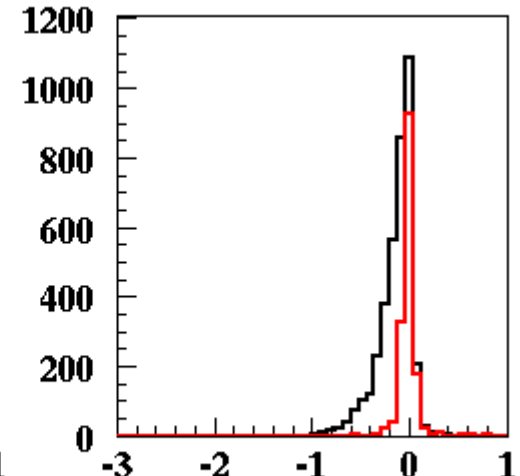
NUMU CC



NC



0.85 E 1.5



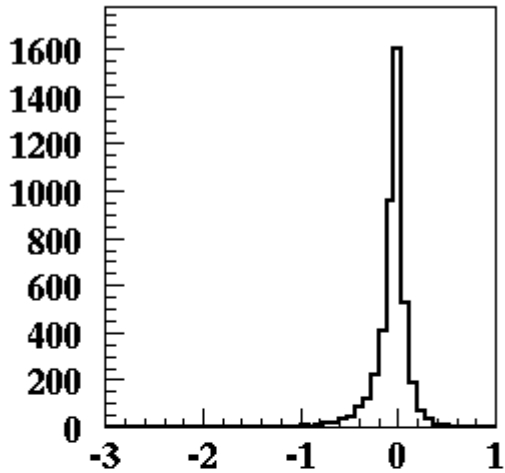
E 1.5

NB see backups for plots including all events

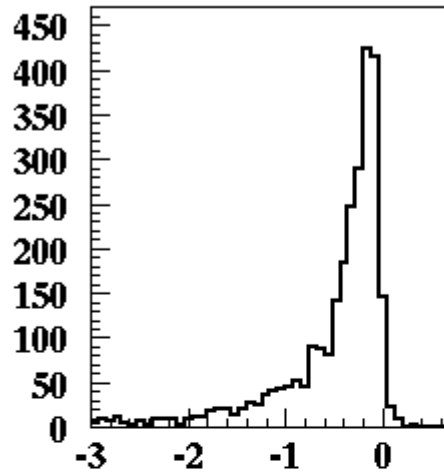
$(E_{\text{rec}} - E_{\text{true}}) / E_{\text{rec}}$

Split according to E-true only
CC events

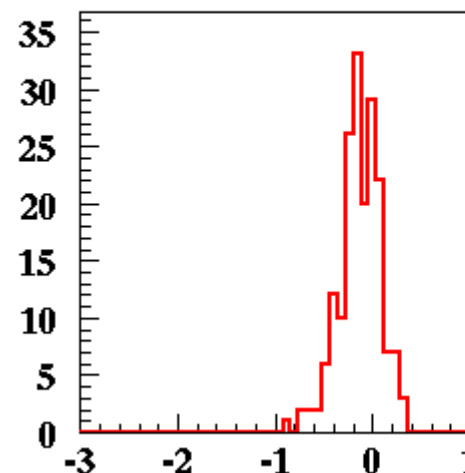
— CCQE events



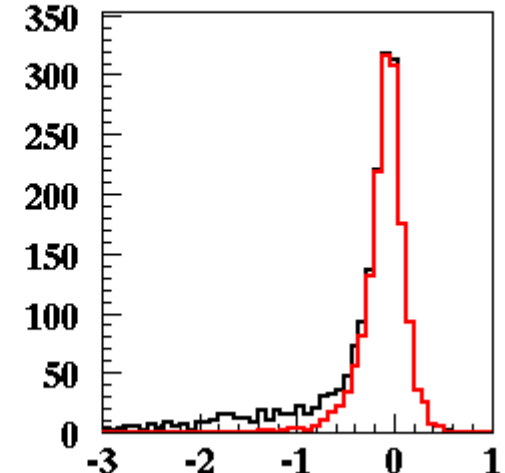
CCQE



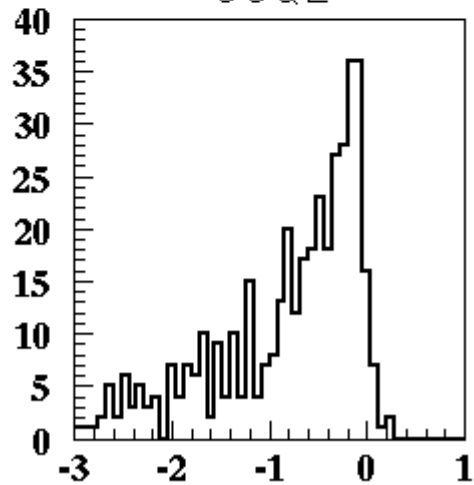
NUC CC



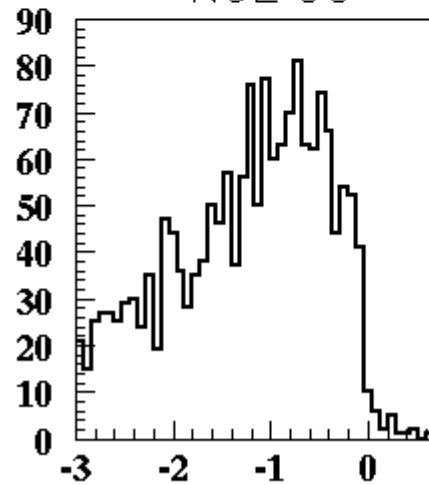
0.35 E 0.85



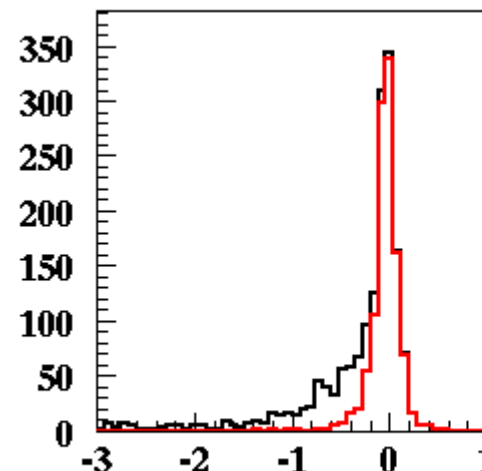
0.85 E 1.5



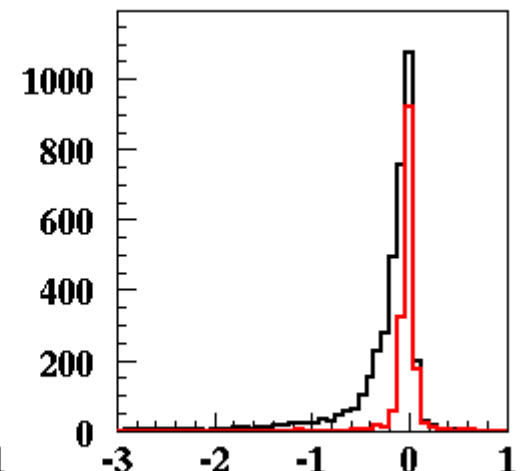
NUMU CC



NC



1.5 E 2.0



2.0 E 2.5

NB see backups for plots including all events

Event by event method

For each event:

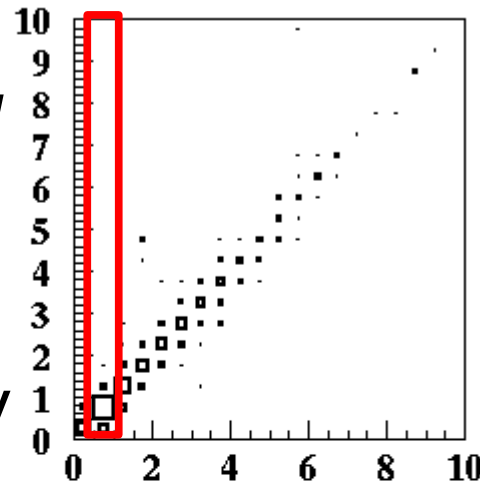
- read E_{true}
- assign E_{rec} according to the matrix of E_{rec} vs E_{true}

Example: $E_{true} = 0.85 \text{ GeV}$
for a CCQE event:

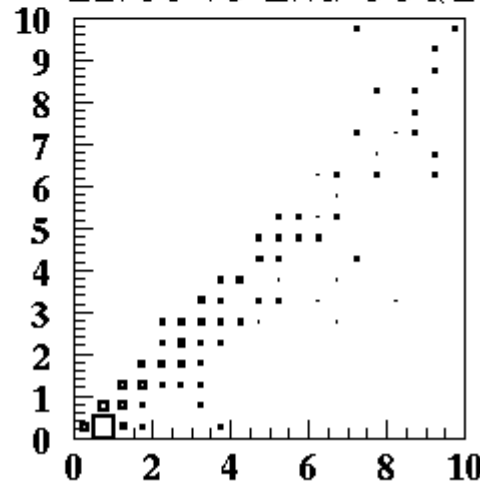
$E_{rec} = 0.25 \text{ GeV}$
10% of time

$E_{rec} = 0.75 \text{ GeV}$
85% of time

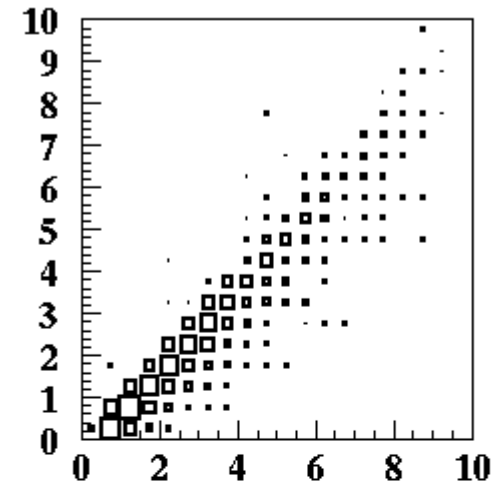
$E_{rec} = 1.25 \text{ GeV}$
5% of time



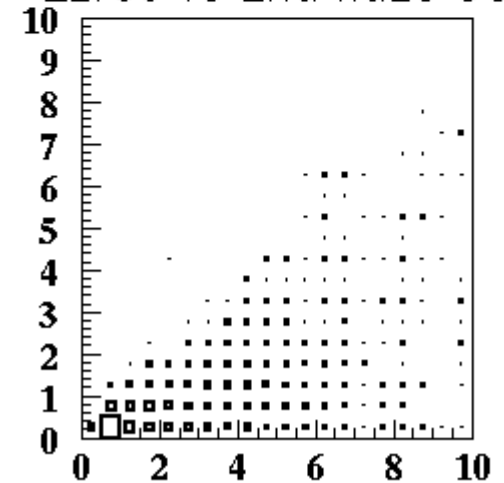
Ezrec vs Enu CCQE



Ezrec vs Enu nuzmu CC



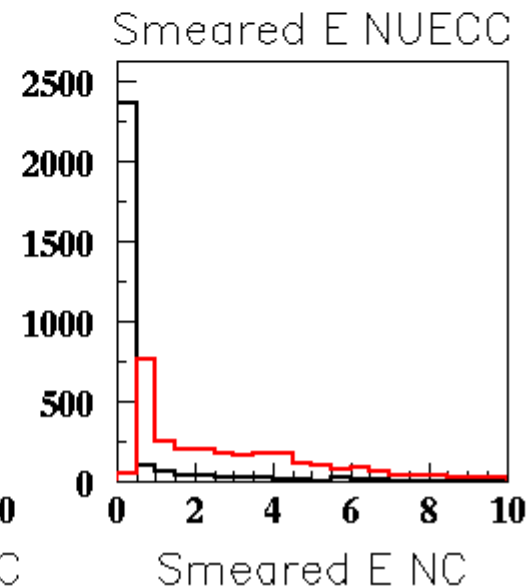
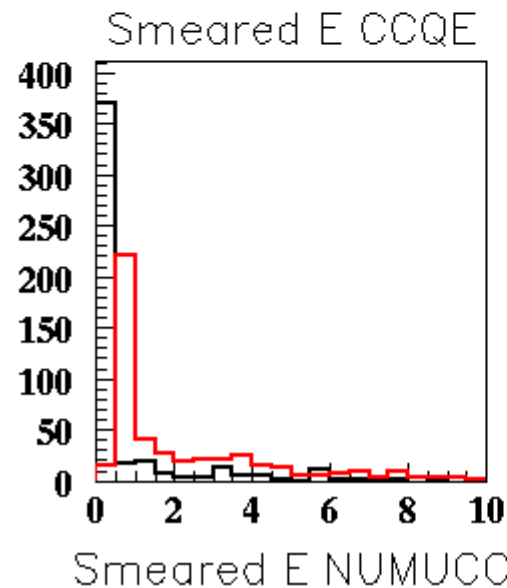
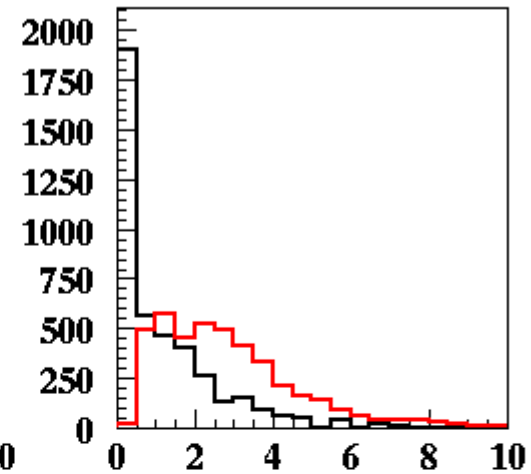
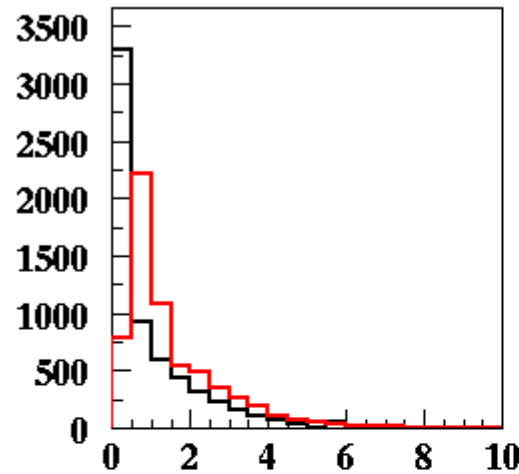
Ezrec vs Enu nuze CC



Ezrec vs Enu NC

Results of event by event method

— E-true
— E-rec

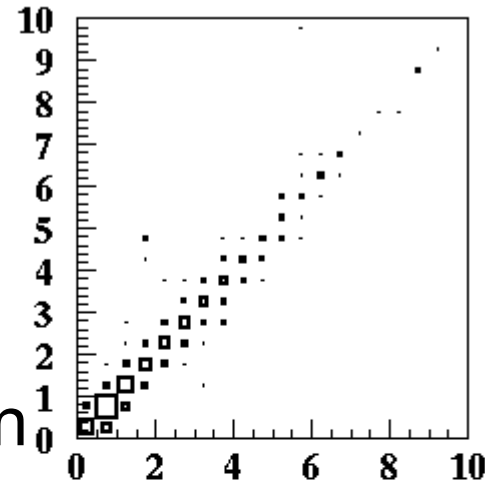


Spectrum Method

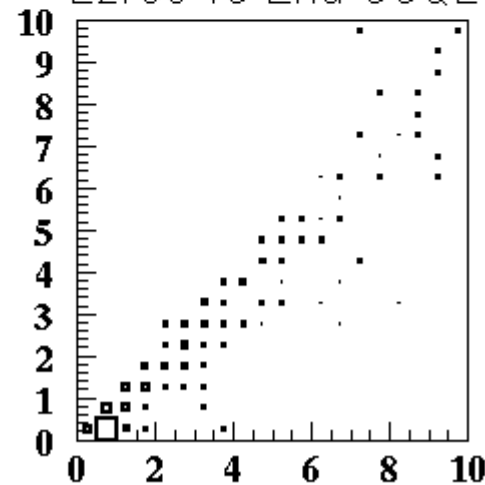
For a given E-true Spectrum:

- Put the E-true spectrum into a vector
- Do a matrix multiplication of the E-true vector * E_rec vs E-true matrix
- Get a E-rec vector that can be turned into a E-rec spectrum.

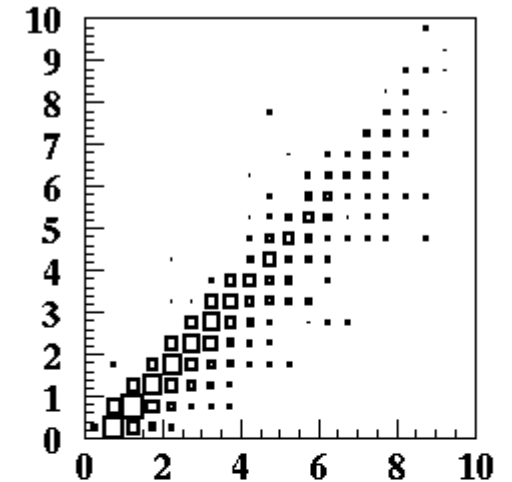
$$\left(E_{\text{true}} \right) * \left(M \right) = \left(E_{\text{rec}} \right)$$



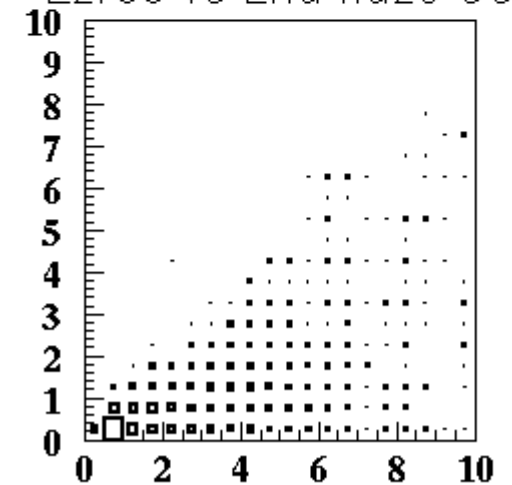
Ezrec vs Enu CCQE



Ezrec vs Enu nuzmu CC



Ezrec vs Enu nuze CC



Ezrec vs Enu NC

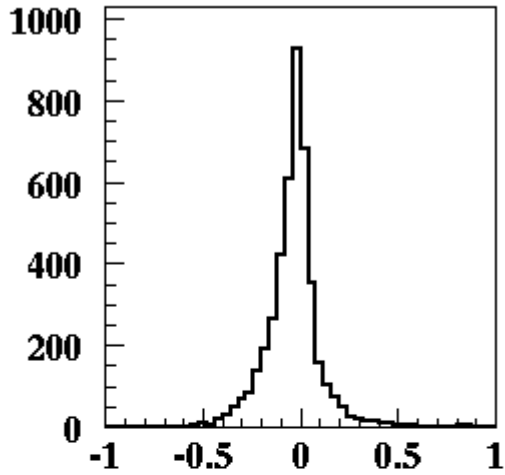
Backups...



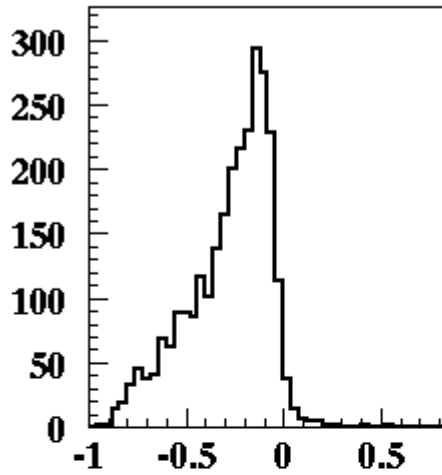
$(E_{\text{rec}} - E_{\text{true}}) / E_{\text{true}}$

Split according to E-true
All events

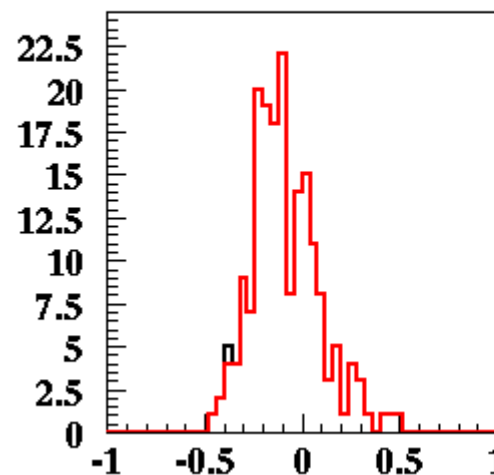
— CCQE events



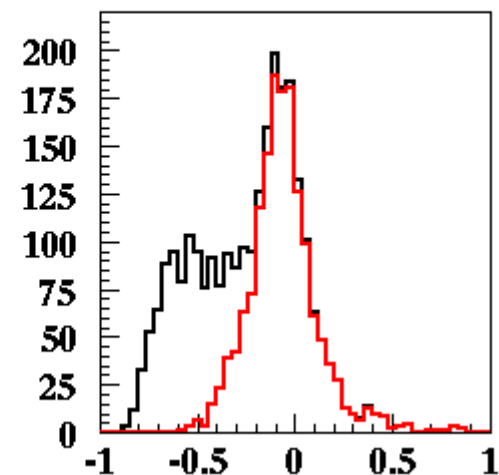
CCQE



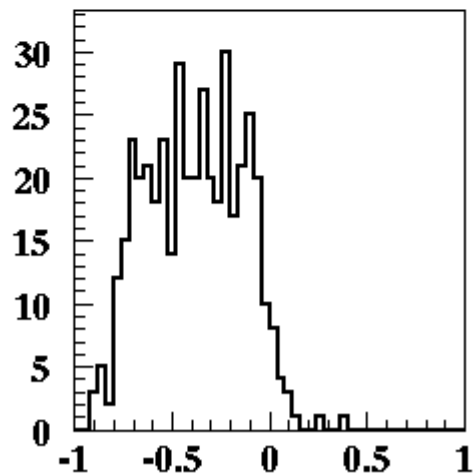
NUC CC



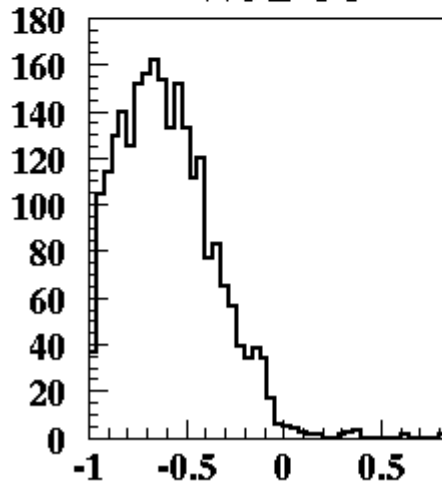
$E < 0.35$



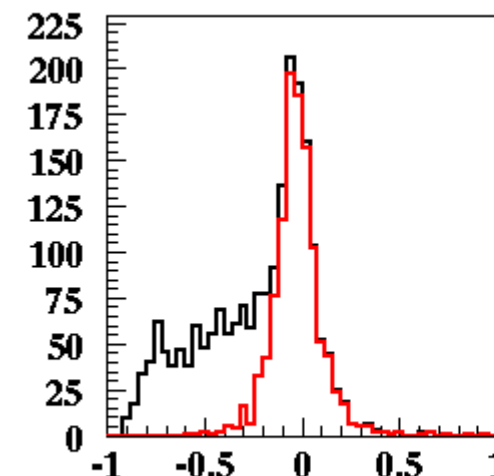
$0.35 < E < 0.85$



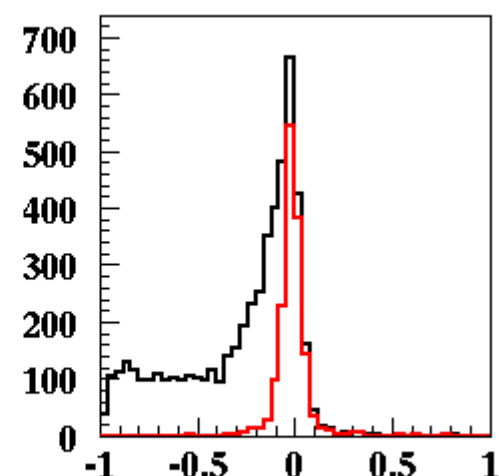
NUMU CC



NC



$0.85 < E < 1.5$

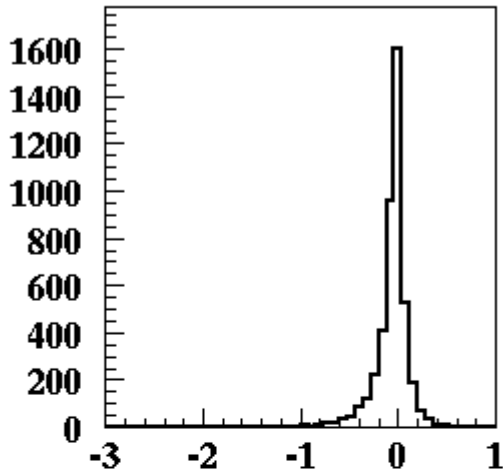


$E > 1.5$

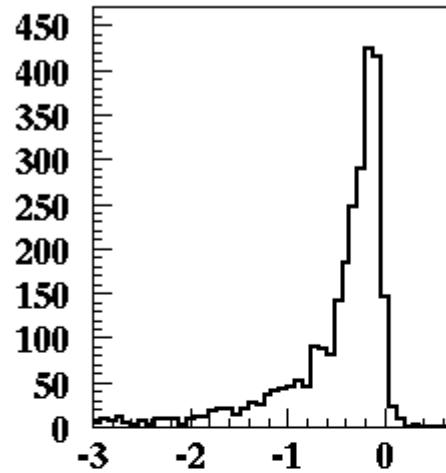
$(E_{\text{rec}} - E_{\text{true}}) / E_{\text{rec}}$

Split according to E-rec
All events

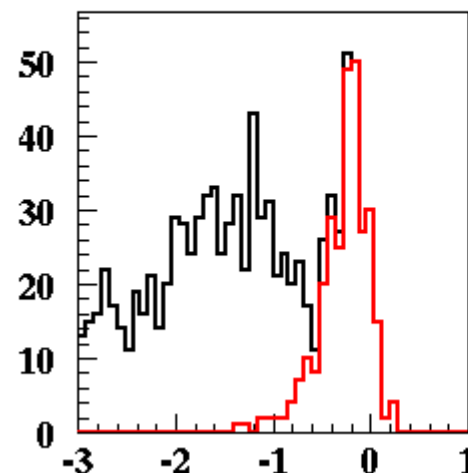
— CCQE events



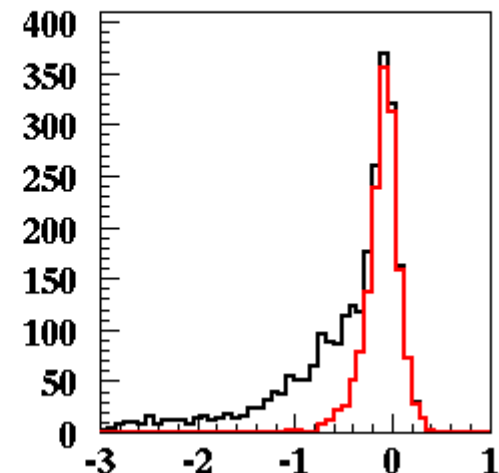
CCQE



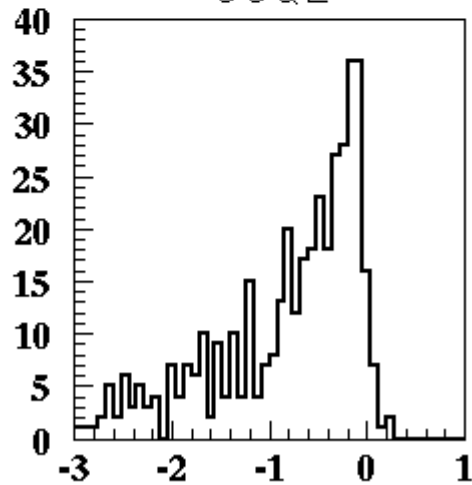
NUC CC



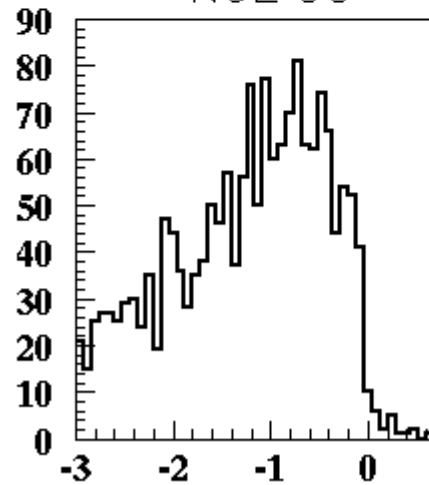
$E < 0.35$



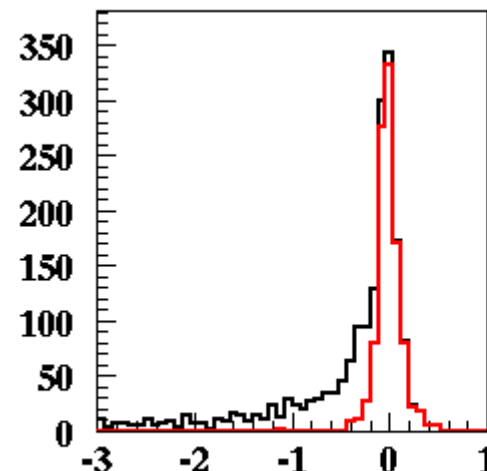
$0.35 < E < 0.85$



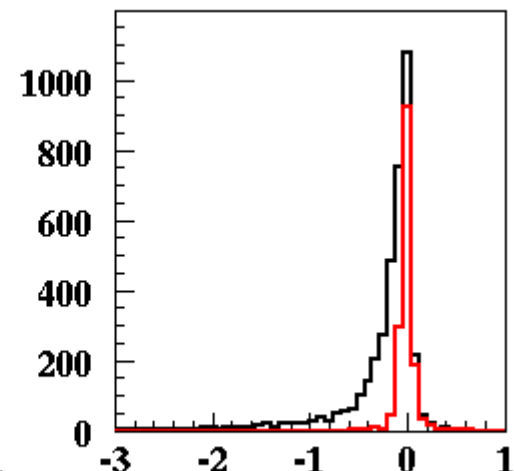
NUMU CC



NC



$0.85 < E < 1.5$



$E > 1.5$