Inelastic Background Subtraction

Two issues in the background subtraction :

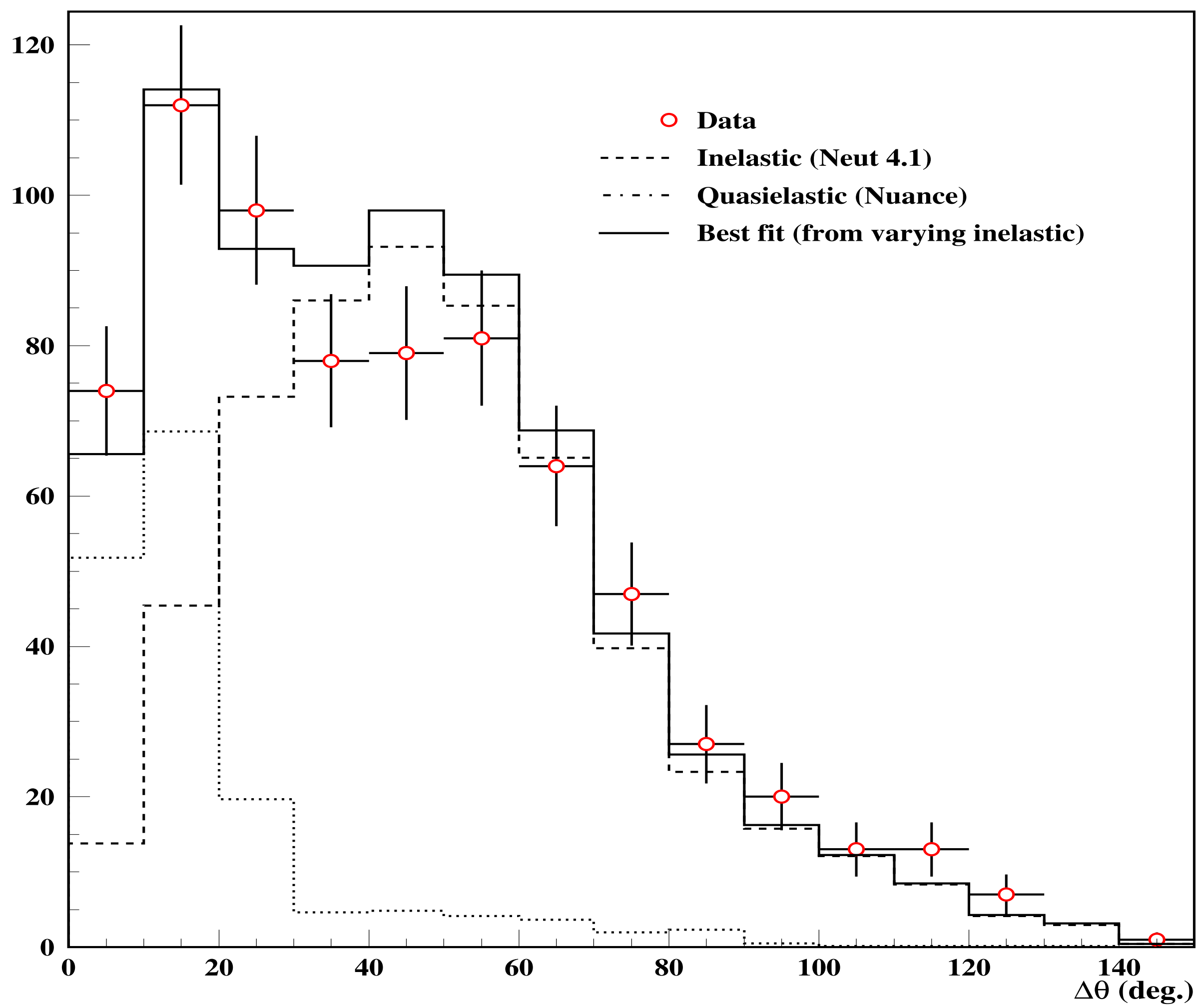
(a) How well does the MC model the overall fraction of inelastics to charged current events?
(b) How well does the MC model the shape of the inelastic background.

(a) Normalisation of inelastic background

- We assume that fraction of inelastic events to all events in the data is the same as in the MC and obtain an error on this number by looking at the 2 track MRD events.

Procedure :

1) Cutting on $\Delta\theta>50$ degrees, vary the amount of the inelastic sample until the best agreement with data is obtained. This number is the amount by which the inelastic sample must be scaled in order to agree with the data.
2) There is still some quasielastic contamination in the tail. Vary the amount of quasielastics by ±30%.
3) Repeat for $\Delta\theta > 30$ and $\Delta\theta > 40$, so as to sample regions with different proportions of the quasielastic tail
4) Take the largest deviation of the inelastic scale from 1.0 as the error on the inelastic normalisation.



Inelastic scale at greatest deviation from 1.0 : 0.94 ± 0.04

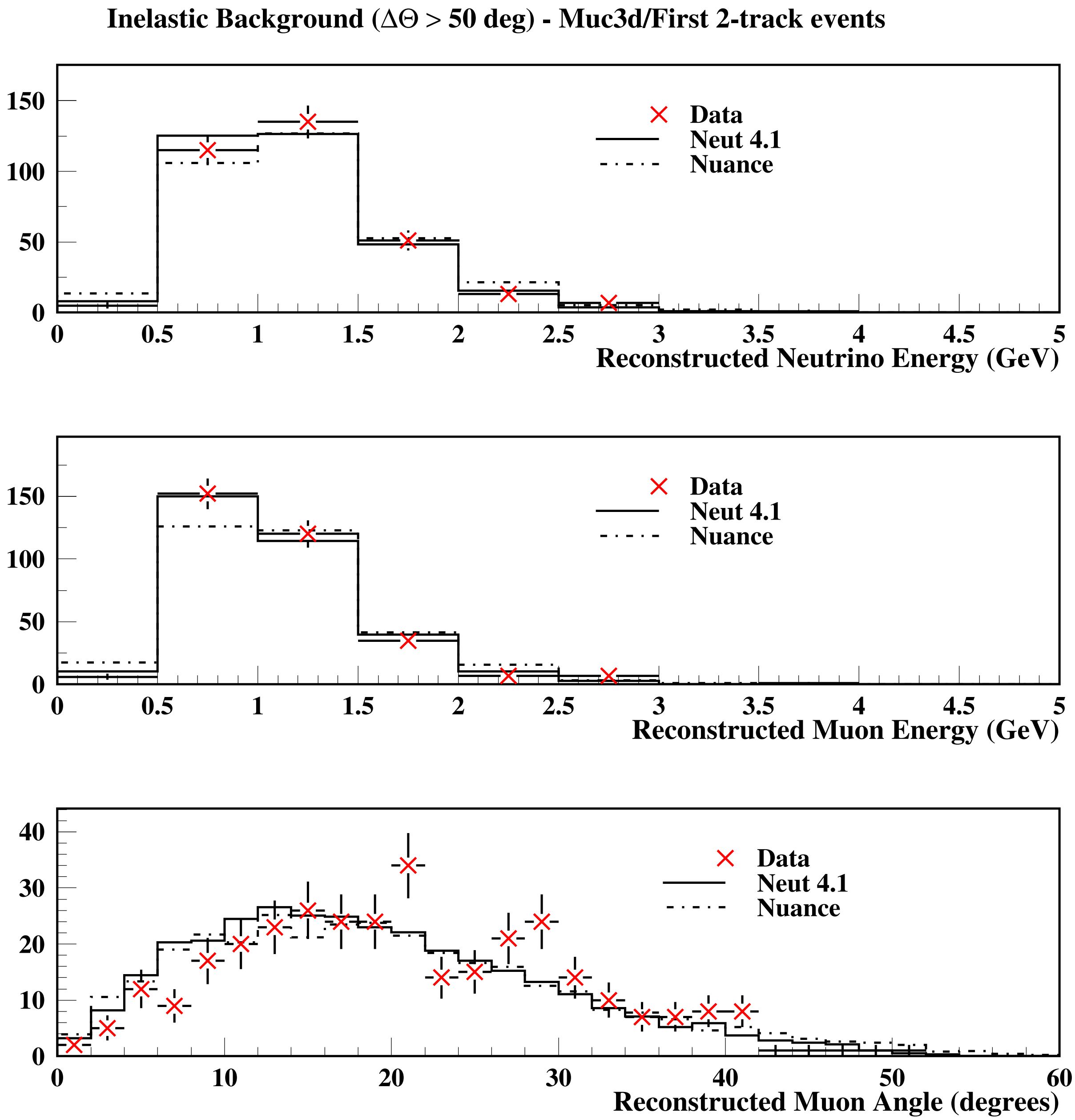
Value used in analysis : 1.0 ± 0.1

Fraction of inelastic background is varied bin−by−bin by 10%. The difference in the final energy spectra is assigned as the systematic error on each bin from background normalisation.

Different combinations of Neut inelastic and QE components and Nuance inelastic and QE components were tried. The background normalisation does not vary by more than 10% for any combination of models.

(b) Shape

Inelastic sample : 2 track MRD 3d events, $\Delta\theta$>50 degrees



Reconstructed neutrino energy, muon energy, muon angle compare well

SO

Assume shape of inelastics in Muc3d and First layer 1 track samples is simulated well.