Improving L/E analysis

Reminder:

I am studying how much we could improve the L/E analysis by identify properly QE elastic events with a visible proton.
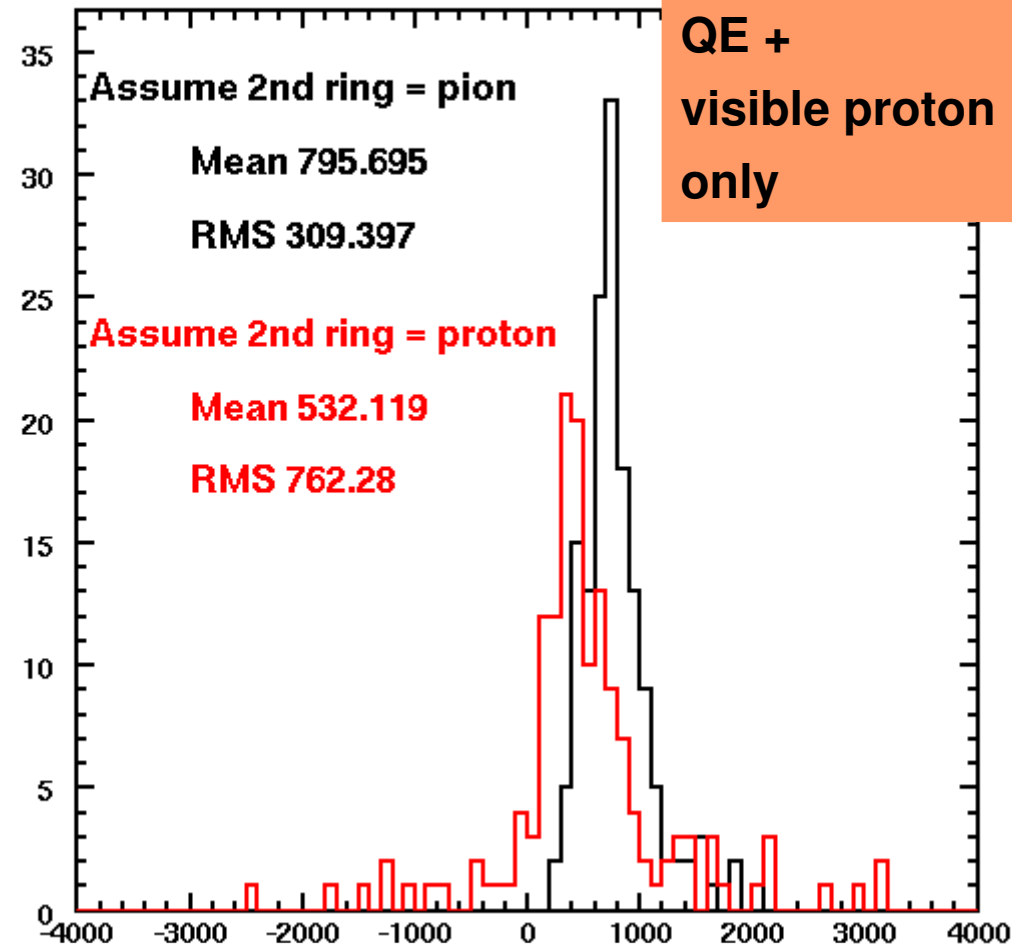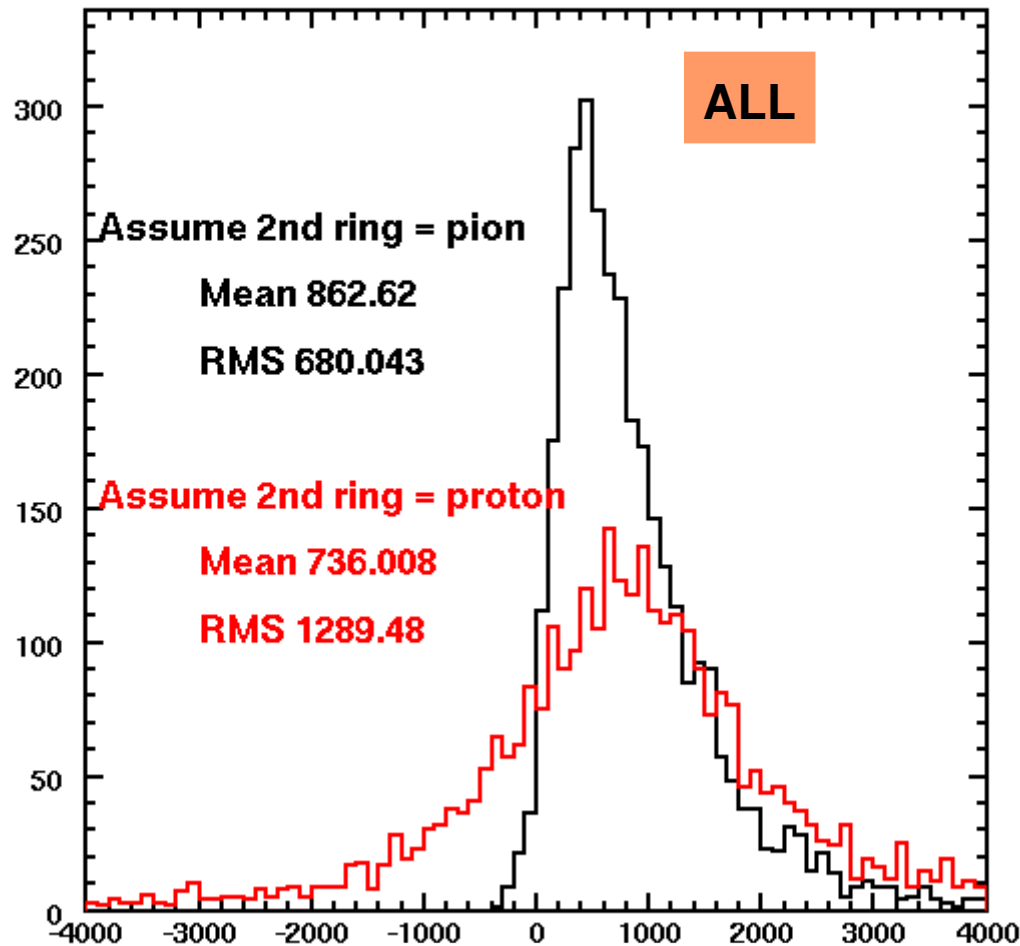
I focus on 2 rings sample.

Summary of numbers

Summary of numbers normalized to 1489 days of data:

	Neut	Nuance
FCFV, mulike	15957	15063
QE	7479	7434
FCFV,mulike,2 rings	666	585
+ visible proton	150	33
FCFV,mulike,2 rings **QE**	63	51
+ visible proton	34	23

- Still investigating difference between neut and nuance
- Reminder: only 5% of events that pass precuts are QE
  with a visible proton

Energy resolution

Input sample: FCFV, 2 rings, most energetic ring is mulike

ALL

Assume 2nd ring = pion
Mean 862.62
RMS 680.043

Assume 2nd ring = proton
Mean 736.008
RMS 1289.48

QE + visible proton only

Assume 2nd ring = pion
Mean 795.695
RMS 309.397

Assume 2nd ring = proton
Mean 532.119
RMS 762.28

True energy – Reconstruced energy (MeV)

The energy resolution does not improve even for QE events
We still want to understand why exaclty

Costheta resolution

Input sample: FCFV, 2 rings, most energetic ring is mulike
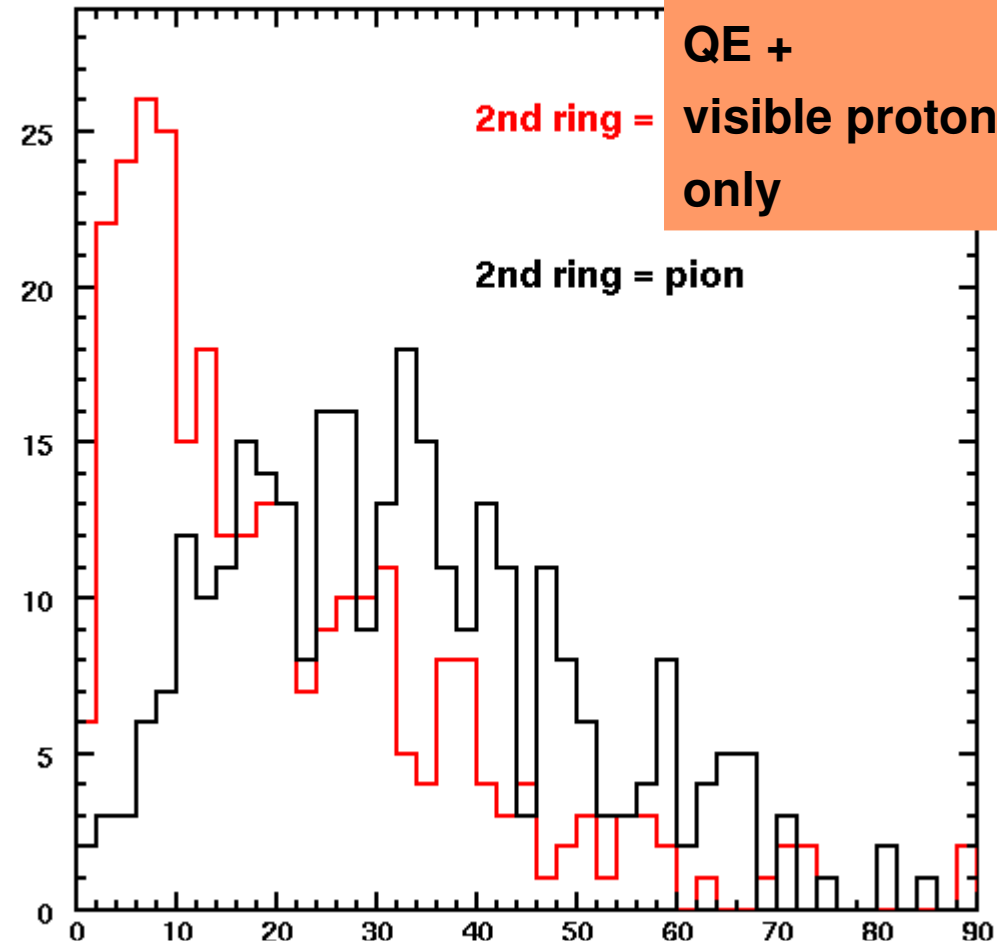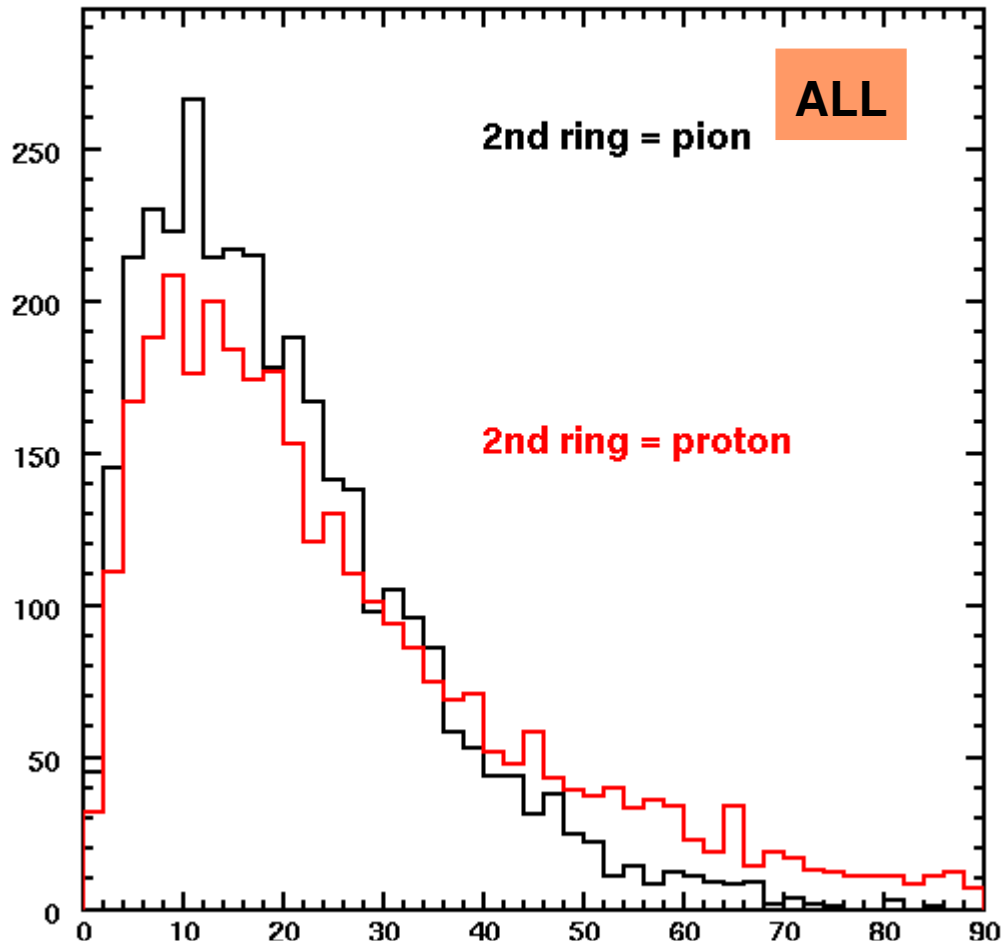
Angular difference between true neutrino direction and reconstructed neutrino direction

The angular resolution would improve a lot.

Conclusions and comments

For **energy resolution**, even identifying the QE events with a visible proton does not help .

The **angular resolution** would be nicely improved if we identify QE elastic with a proton events properly.

We could use: - Maxim's proton ID algorithm
                   - Cut on the Cherenkov angle
                        (proton will have collapsed ring)
                   - Probably other cuts.