Angular correlation.

We already presented the angular correlation for our experiment. In order to see the backward peak we looked on the angular correlation when we subtracted the background. The background subtraction was done in the following way: Opening angle distribution in time minus opening angle distribution out of time.
Additional way to extract the background reduced distribution of the opening angle is by using event mixing.
Event mixing was done in following way. For each real e,e'p event I simulated a neutron (with some constant CM motion) and simulated constant background. The resulting TOF is presented in fig 1:

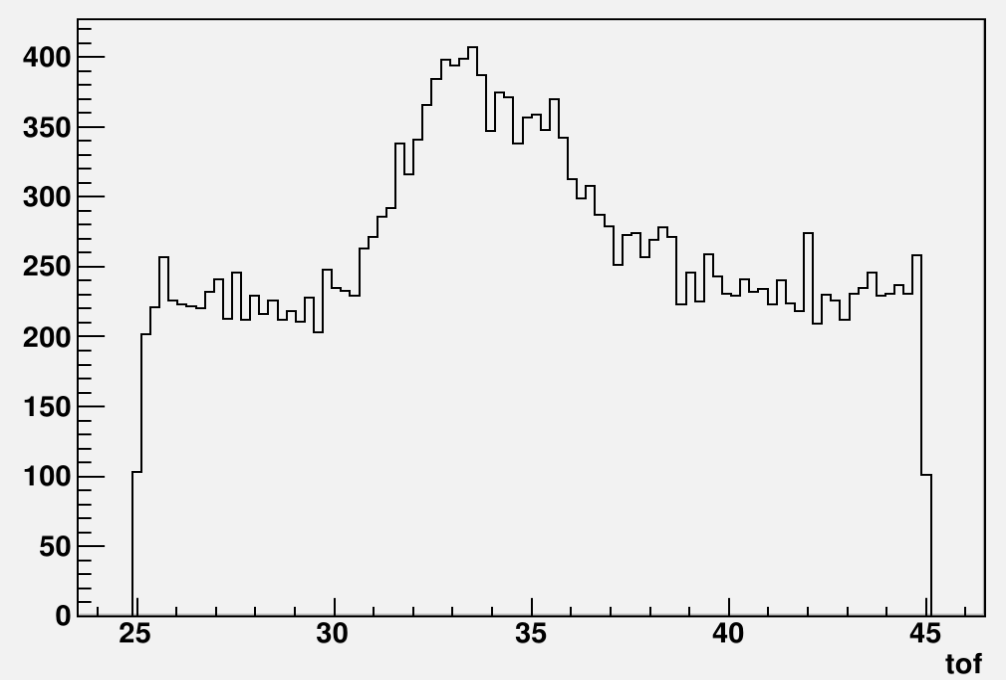

fig 1: simulated neutron TOF with background for 750 e,e'p case.

For this data set, I know exactly which signal is background and which is “true” neutron.
I perform event mixing by taking the e,e'p from event “i” and the neutron from events that different from event “i”.
This mixing should give me the same angular distribution of the mixed events as a pure background.

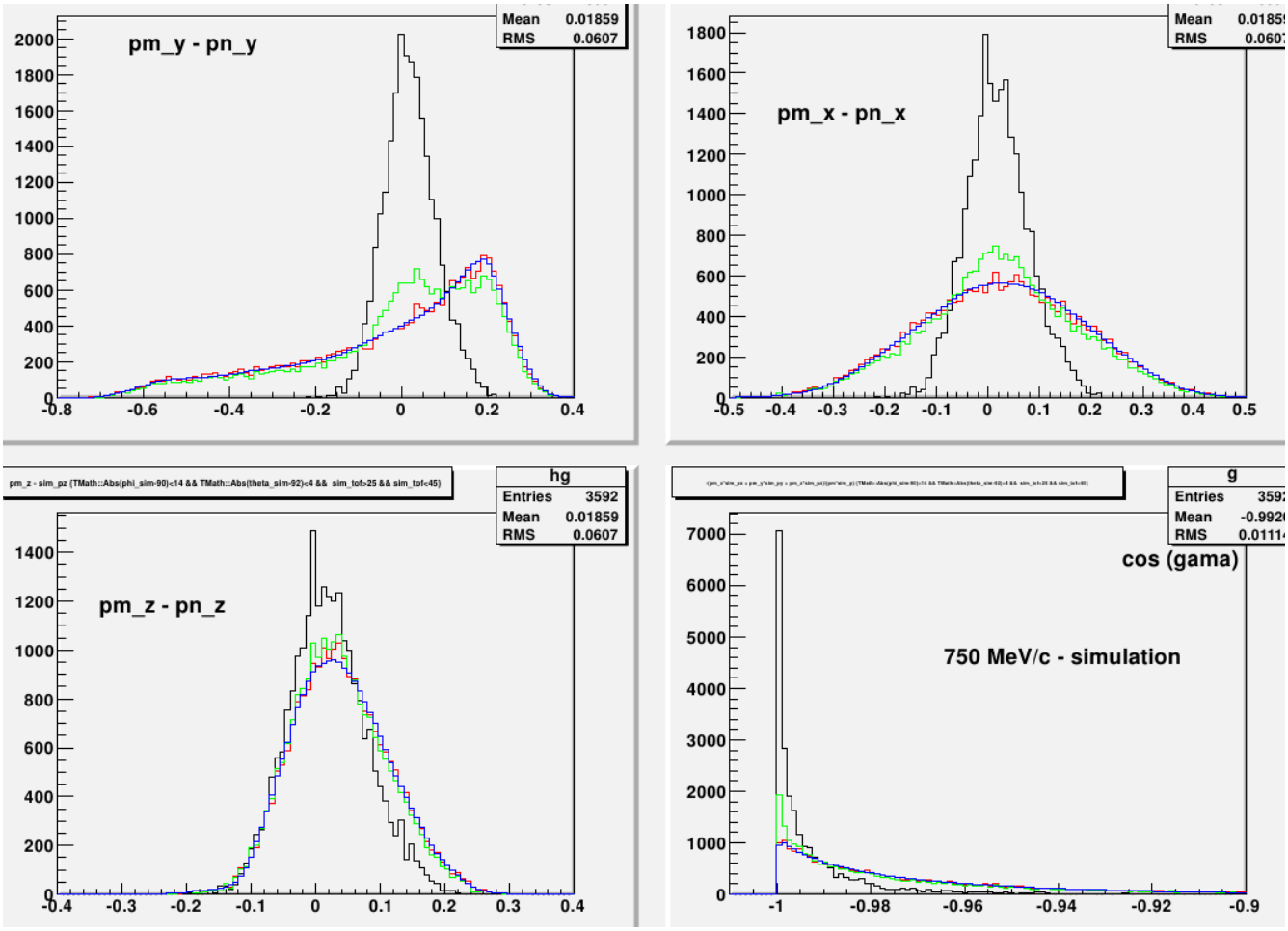

Fig 2: Simulation result

Black histogram- pure signal
Green – combined signal and background (the ratio can be seen in fig 1)
Red - pure BG distribution
Blue – mixed events

The top (left and right) and bottom left are the difference between the pmiss and p neutron in the lab frame (the CM motion).
The bottom right is the angular correlation.

I can use the same procedure for the real data. The results are presented in the fig 3,4 and 5.
The Black histogram is the opening angle for Signal + background.
The Red histogram is the background using the event mixing technique.
The Blue histogram is the background using the off time values.

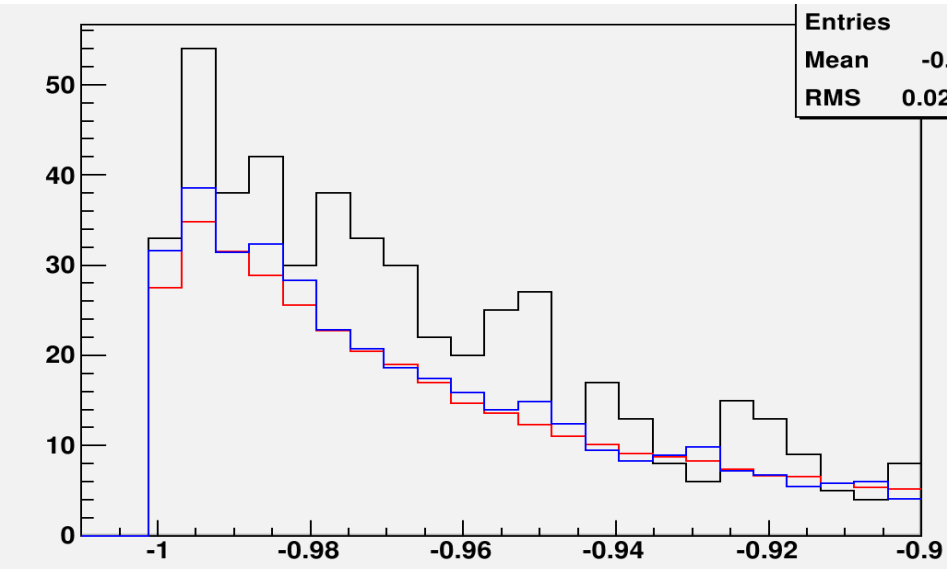

Fig 3: 500 MeV/c

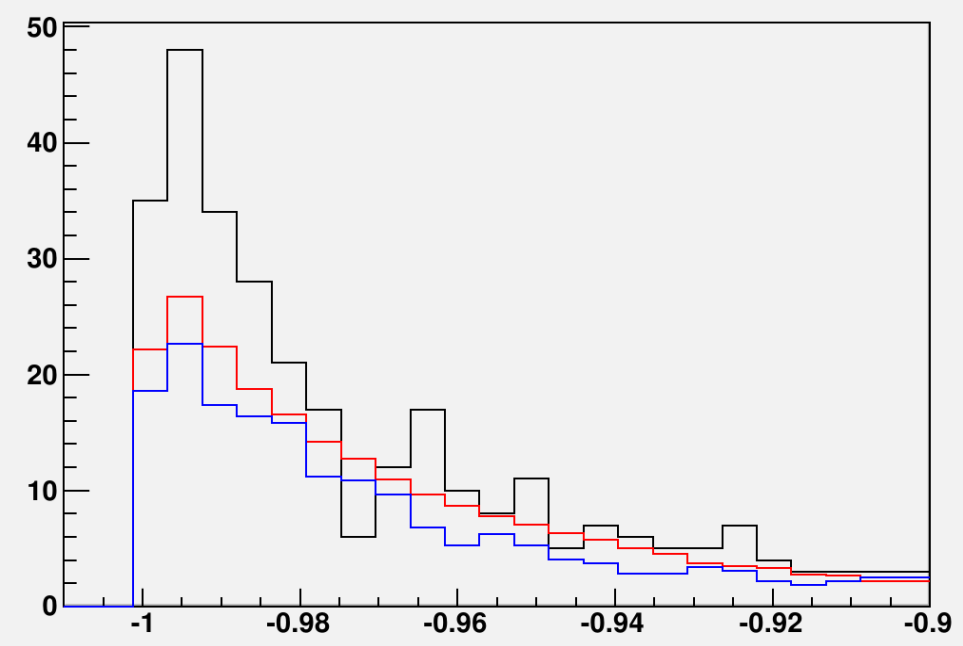

fig 4: 625 MeV/c

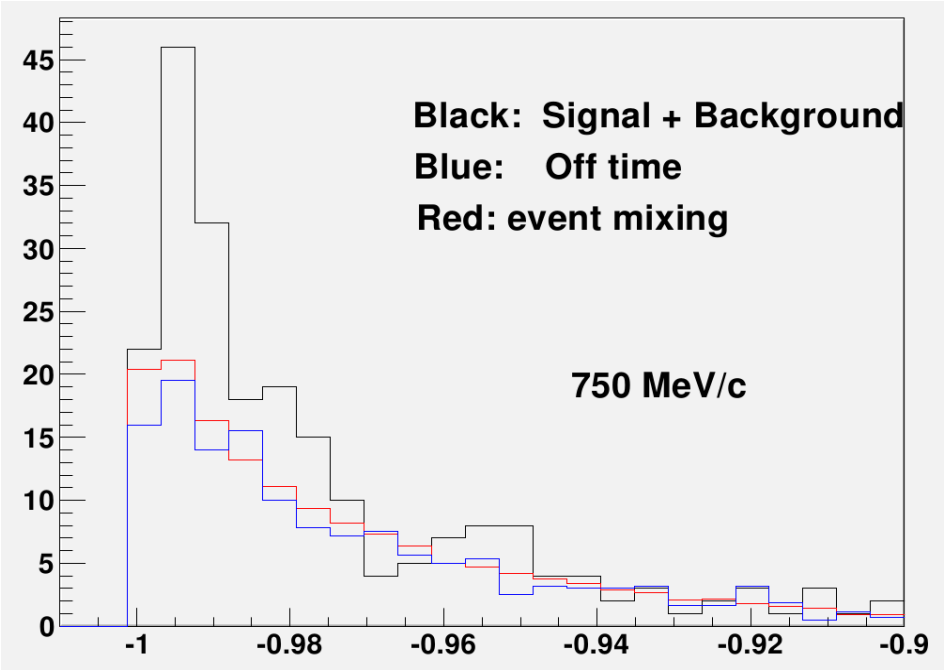

fig 5: 750 MeV/c