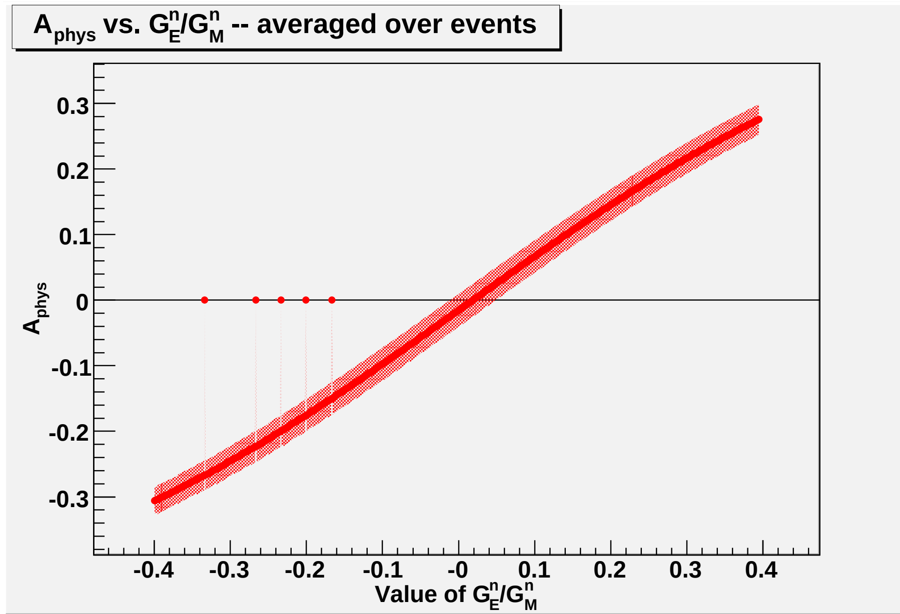

FIG. 24: Acceptance curve for kinematic 2

G. Corrections

1. Single Quasi-Elastic Analysis (SQE) and Background Correction

?-? Why do we need SQE

There are a significant portion of events in which the hadron has multiple scatters or an accidental background hit occurs such that the hadron and accidental can't be differentiated (10%), and it is difficult to determine what was originally incident on the neutron arm. An additional aspect to this problem, is that if there are two or more hits in the quasi-elastic region, the charge becomes impossible to determine since even just one 'hit' in the veto detectors, associated with the quasi-elastic region, will set all quasi-elastic hits as charged.

?-? what is SQE

By restricting the analysis to only those events which only have one quasi-elastic hit the problem of charge identity and multiple quasi-elastic hits is solved. It solves both the charge determination problem, and the determination of which quasi-elastic hit accurately reflects the incoming hadron problem, as well as problems with determining the background charge, related to the charge determination problem. Using this single quasi-elastic hit analysis (SQE), however, makes determination of the background more complicated.

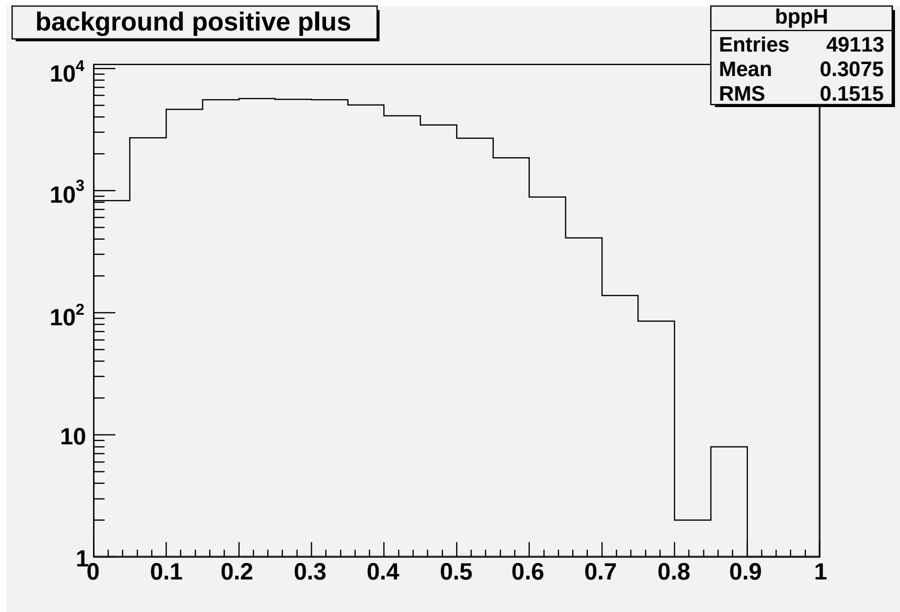

FIG. 25: Plot $q_\perp$ for a region in time. This is 11ns removed from the peak region.

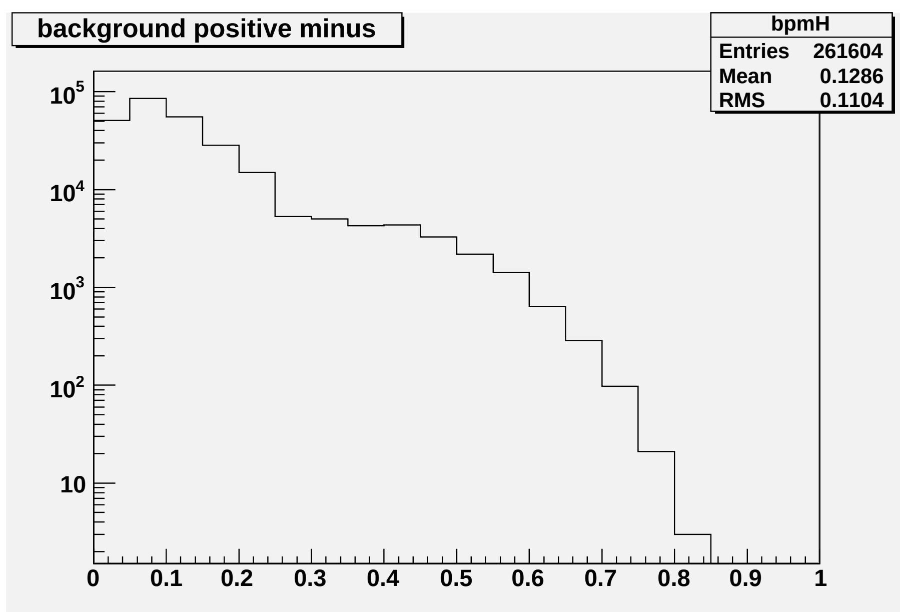

FIG. 26: Plot $q_\perp$ for a region in time. This is at the quasi-elastic region.

Since the quasi-elastic region is restricted to a single hit, multi-hit events are eliminated. This ensures a clean spectrum far away from the quasi-elastic region. Using perpendicular transferred momentum, q_{perp}, this distance can be parameterized in the same sort of variable

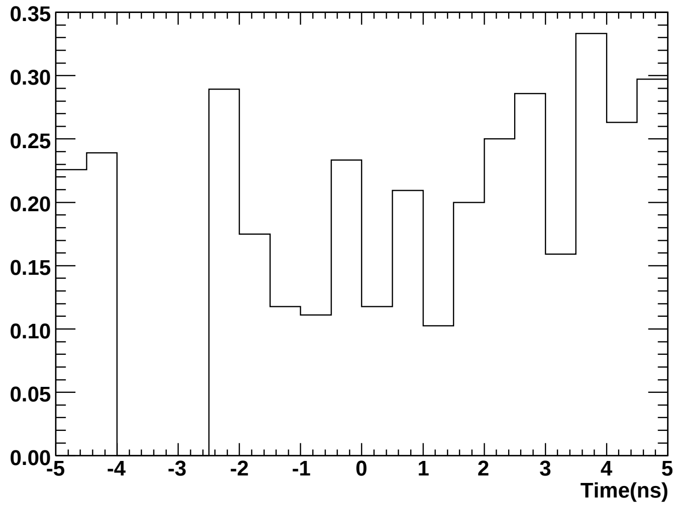

FIG. 27: Plot of the ratio of uncharged to charged for the region of $q_{\perp}$ between 0.55 and 0.60 GeV/c. The region near 3 ns is removed due to the photon peak being there. Add axis information time (ns)

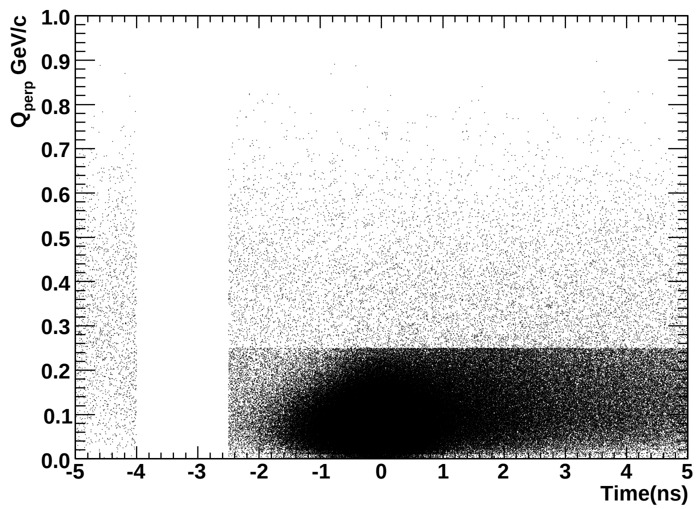

FIG. 28: Plot of q_{perp} versus time of flight for events with only a single hit in the $\|t\| < 5$ and $q_{\perp} < 0.25$ region. The photon peak area is removed.

as that which is used to select quasi-elastics. In this band of q_{perp}, the ratio of charged to uncharged background is constant (see figure ??). This gives the ratio of charge for the background that is unrelated to the quasi-elastic events.

The only determination that is made in this region is the charge ratio of the background. The counts must be determined via a different mechanism.

?-? now for the total accidental background counts determination

Since it is required that every hit in the quasi-elastic region is either a single quasi-elastic hit, or a single background hit, the total number of counts (and events) are:

$$N_{counts} = N_{background} + N_{quasi-elastic} \tag{40}$$

Looking in the quasi-elastic window, before the events are incident, the hits are background (see Figure ??). Every hit that is in this earlier in time region exists because there was an accidental background hit in this region. Additionally, for all of these hits, there was no quasi-elastic hit since they are in the SQE region. Using these counts (scaled properly) from this background region provides the background in single quasi-elastic hit analysis. This is essentially the total counts. To determine the neutral accidental background, the earlier determined background ratio term is used:

$$N_{neutral,background} = N_{background} f_{background} \tag{41}$$

Here f is the fraction of neutrals to hadrons in the background.

After the asymmetry and counts of the background are calculated, the observed neutral (and proton) asymmetry can be corrected for the background. Here A is the asymmetry, N is the counts, $_{back}$ is identifies the background, and $_{raw}$ identifies the non-background corrected.

$$A_{asymm} = \frac{N_{raw}(A_{raw} - A_{back}\frac{N_{back}}{N_{raw}})}{-N_{back} + N_{raw}} \tag{42}$$

2. RF correction

The RF correction is calculated like so:

$$\begin{aligned} rfttc = B.tr.vz[0]/.3 + .1183 * (D.rftime[0] - D.reftime[0] - \\ int((D.rftime[0] - D.reftime[0]/(.5 * wrap)) * wrap) \end{aligned} \tag{43}$$