Neutron analysis

1. HAND calibration

1. Determine the pedestal values.
For each ADC, determine it's pedestal and update the common data base.
Check stability during the production time. Work with pedestal subtracted histograms from now on.

2. calibrate energy deposit.
Convert ADC channels to energy deposit in units of MeVee.
Use 1GeV/c protons from the H(e,e'p) reaction - only run 1314 is good.

In each event, for the bars that are hit by the proton, calculate the expected energy deposit, taking into account exact proton angle, momentum etc.
Look at the distribution of ADC_channel / Energy_deposit and determine it's mean and width.
These values are the number of channels corresponding the 1 MeVee energy deposit and it's error.
Look at E DE plots of pair of sequential bars – punch through points etc.

3. determine the threshold for each PMT and it's stability over the experiment.
For each PMT, determine it's threshold channel by looking at its ADC distribution with and without a TDC cut and seeing where the two histograms merge.
Based on the calibration of step 2, determine the corresponding energy deposit.

Do the above for each bar, and for runs from the beginning, middle and end of the experiment and look at the stability.
Determine a SW threshold for each bar \layer \HAND (depending on the results)

4. calibrate the relative timing offsets for all bars.
Determine appropriate TOF offsets that will align the relative timing of all the bars.
Use 1GeV/c protons from the H(e,e'p) reaction - only run number 1314 is good.

In each event, for each bar, calculate the expected TOF minus the measured TOF, taking into account exact proton flight path etc.
Determine the offsets needed to bring this distribution to zero.

5. calibrate the absolute TOF.
Use d(e,e'pn) x>1 data to determine an over all TOF offset that will make HAND TOF values correspond to momentum.
Compare TOF for particles that hit more than one bar (sequential or neighbors)

6. calibrate hit position for each bar.
Use any singles \ recoil data to determine the parameters needed to span the hit position distribution

from -50 to 50.
Do for different runs from beginning \ middle \ end of the experiment and check the stability.

Check the results by looking at H(e,e’p) data where the q vector defines the hit location.
Look at expected_hit / _hit and get the mean and width. Should be a narrow as possible and centered on zero.