Brief Review of Progress [or lack thereof] on Pad Interpolation Algorithm

Peter Lewis, 15 June 2007

Program and information:

[All files on kzero at /u3/pmtscans/2007_scan14_2122/]
Main ROOT script: scan_analysis.C
Main ROOT file: scan_analysis.root
Hard copies of histograms: *.jpg
Program execution script: runit.csh

First objective:

Create code infrastructure to enable complete understanding of ADC and TDC response and distribution

Second objective:

Generate calibration curve to interpolate between pads 21 and 22. The curve must be a 1:1 correspondence relation between ADC response and single photon position.

Procedure [red entries unfinished]:

1. Create histograms containing ADC data for individual pads
   [ADC values vs. x: h_adc2*_x, occupancy: h_occuADC2*].

2. Create profiles of ADC values in plateau region
   [limited y values: subWinMin to subWinMax, profiles:
   p_win_adc2*_x].

3. Normalize the profile plots to pad gain by summing entries in a limited central region of each pad and dividing each pad's profile by this normalization quantity [range: peakSampYMin[/Max], peakSampXMin[/Max], normalization quantity: peakSampVal2*, normalized profile histograms: p_wind_adc2*_x_norm]

4. Create 1:1 profiles. Ideally the quantities $q_{21}/(q_{21}+q_{22})$ and $q_{22}/(q_{21}+q_{22})$, when plotted versus x [q_a is the value at x of the normalized profile plot for pad a], will form a 1:1 map in x that should map fractional ADC values recorded to the most likely x-position for a single photon to create that charge-sharing distribution between the two pads [h_frac_wind_adc2*_x].

5. Construct calibration data for all pads from test scans

Notes:

The step which has halted the progress is the normalization step. Despite the fact that this step should be trivial, the pad profiles for pads 21 and 22 have shown a large difference in peak height even after normalization. It is possible that there is some inconsistency with the way pixel boundaries are defined.

Another potential problem is the fact that the profile plots are not 1:1 themselves. This is expected, but makes creating a 1:1 curve from the profile plots for two pads difficult. The best solution is to define a “transition region” between pads which is 1:1 and only solve for a calibration curve inside this region. The curve values will be hand-set to 1.0 or 0.0 [depending on which pad you are evaluating] on either side of the transition region.