CsI Time Walk

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A correlation between the amplitude of the signals and their times of arrival is expected for many detectors. Such a correlation is mostly due to different risetimes of signals with different amplitudes, and is commonly referred as a time walk. The 1997 run addition of TDC information to 192 CsI channels allows us to observe the time walk and make conclusions with some relevance to 1995 data.

The time-amplitude scatterplot is shown on Fig. 1. The plot is made of 20,000 0-2-2K+K− triggers with two gamma clusters in the LGD. All CsI crystals are included. Higher TDC counts correspond to earlier times. The energy scale is linear. The time-walk correlation is clearly seen (the strip pointed by an arrow). We will assume that only the events lying on the time-walk strip are associated with real CsI hits (they presumably should be vetoed). The vertical strip in the low amplitude region represents the ADC pedestals.

Using the time-amplitude plot, we can estimate how a CsI energy cut will affect a 0-2-2 data sample. The asterisk graph on Fig. 2 shows the percentage of the sample which will be lost when a given CsI energy cut is applied. The dots on Fig. 2 estimate what part of the cut events have real CsI hits. Using the graphs on Fig. 2, one can look for an optimal value of CsI energy cut. It should be kept in mind however that the presented plots are obtained from a "raw" data sample. Any cuts, kinematic requirements etc. can significantly change the results.

Figure 1

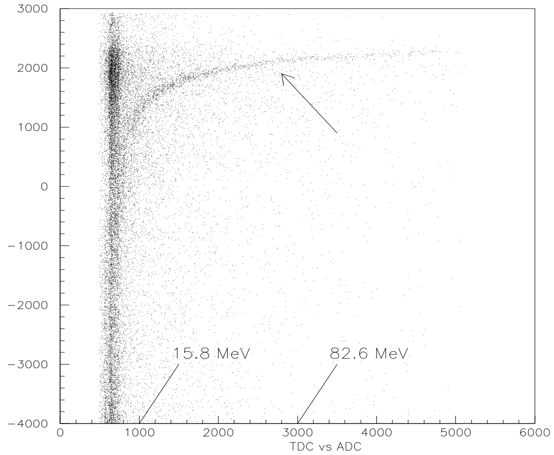

Figure 2