# BCal Timing Resolution Analysis - Note 2

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## 1 Misalignment

I think I've put together a plot that shows better by what I mean when I think it is the tagger, more specifically the offsets, causing a larger contribution than expected from the tagger making it more difficult to separate the BCal's resolution out. Figure 1 is a plot of the sum of the bcal ends using the tagger as a reference. If you look at the bottom plot, the resolution vs energy, you can see that the significant deviations, the large humps, are in the same places as where there is a significant misalignment of the t-counter times, as seen in the top plot (at least, I assume that is what those groupings are from). It is not the t-counter width of the group itself but its offset and overlap that are the culprits. When one takes slices of the energy to measure the resolution at that energy any misalignment of two groups that overlap at a given energy will make the peak wider than it should be.

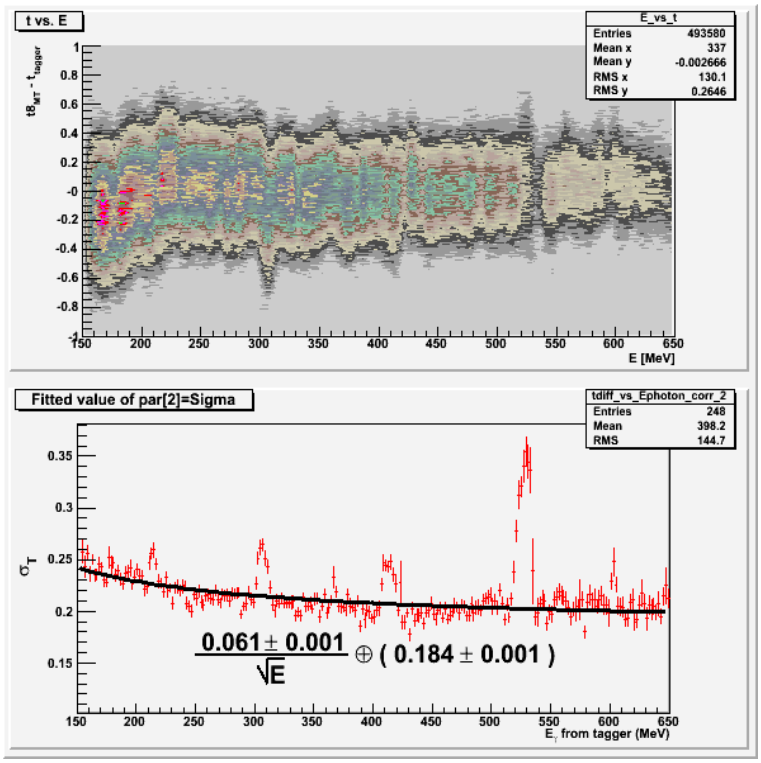


Figure 1: The deviation from the adjacent counter in the top plot create a larger resolution as seen in the bottom plot.

As suggested, I used on of the BCal cells as a reference instead of the tagger. Figure 2 shows the timing versus energy. One can see that there are no the misalignments present, as expected since there is no tagger involved directly. And looking at Figure 3 the fluctuations in the resulution as a funtion of energy are not observed. You will note that the resolution deviates from $1/\sqrt{E}$ at the lower energies. I expect this is from removing cell 7 from the resolution calculation

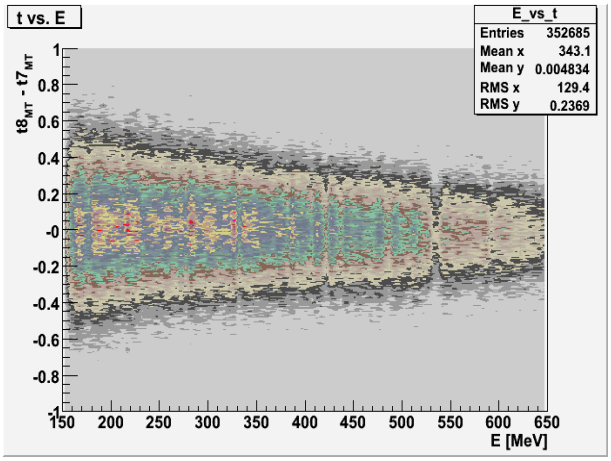


Figure 2: The mean time versus energy spectra of the BCal for cell 8 referenced to cell 7.

since we have used it as the reference. This also may be from a poor walk correction that is now apparent once the tagger contrubution is removed. The walk correction would have the largest effect on the resolution at low energies.

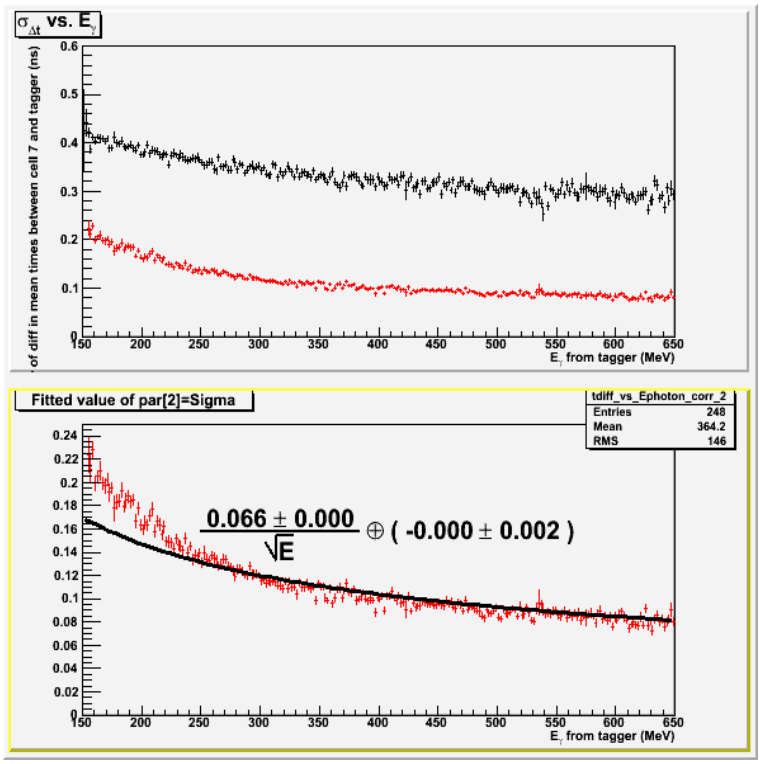


Figure 3: The timing resolution from the energy weighted clusters without cell 7 (it was the reference).