Monte Carlo for tmax-cut

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Reminder

- On workshop cut on $t_{\text{max}}$ of the filtered waveform has been proposed

- Today: $t_{\text{max}}$ of GEANT matched digi’s (generic BB monte carlo)

Cut first and last bin: removes $\sim 40\%$ of all digis
Nine instead of eight search bins are used in MC!
How big are the losses?
Acc(tevt) :  
$$\left| t - t_{evt} \right| < 120 \text{ns}$$

$$t_{evt} = \sum_{i=1}^{n} \frac{E_i t_i}{\sum_{i=1}^{n} E_i} \left| E_i > 30 \text{MeV} \right.$$
Energy loss per event

- Additional loss (~15 MeV) small compared to loss by event time cut
Ghit-energy loss per event

- Only a small fraction of the lost energy is background
Energy spectrum

Rej(tevt)

Rej(tmax)
Summary

- Tmax cut rejects 40% of the digis at the very beginning of the online feature extraction.
- The cut removes 6% of the GEANT matched digis in BB-generic monte carlo compared to 23% for the event time cut.
- The cut introduces an additional loss of 1.6% of the GEANT matched digis (after the event time cut has been applied) or approximately 15 MeV/event.
Digit time resolution important to remove out of time background digits.

Previous studies concluded, that using the moment time

\[ t = \frac{\sum_{i=21}^{29} E_i \cdot i}{\sum_i E_i} \]

of the unfiltered sample gives best results
Moment time of filtered waveform

- solid: data
- dashed: cyclic