HyCal Trigger Efficiency

Maxime Levillain

December 5, 2016

Formula and Basic Cuts

$$\epsilon = \frac{N_{triggered}}{N_{base}}$$

- N_{base} is defined as the number events in a base set Ω_0 of events we are insteresed in. An event belongs to this set if:
  - it has exactly one reconstructed hit in the tagger
  - it has exactly one reconstructed cluster in HyCal
  - the time between HyCal and the tagger is below 40 ns ($|t_{trigger} - t_{tagger}| < 40ns$ cf Tagger Spectra 10/28/16)
  - the reconstructed cluster is close to where the beam was during the scan ($|x_{cluster} - x_{transp}| < \Delta x_{max}$ and $|y_{cluster} - y_{transp}| < \Delta y_{max}$)
  - the cluster energy corresponds to the tagger energy ($|E_{cluster}/E_{\gamma} - 1| < n \cdot \sigma_{E_{cl}/E_{\gamma}}$)
- $N_{triggered}$ is defined by events belonging to Ω_0 and triggered by HyCal ($trigger = LeadGlassSum$ or $trigger = TotalSum$)

Effect of basic cuts on the efficency

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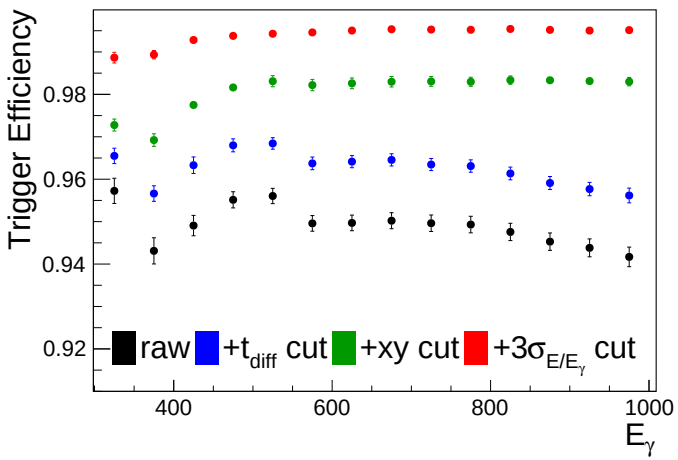
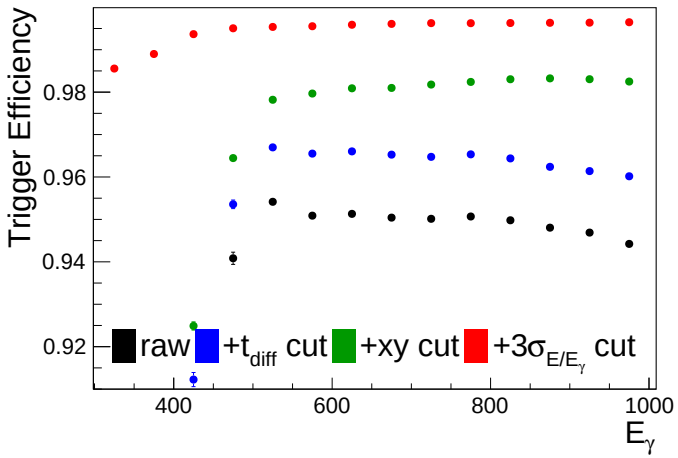


$PbWO_4$



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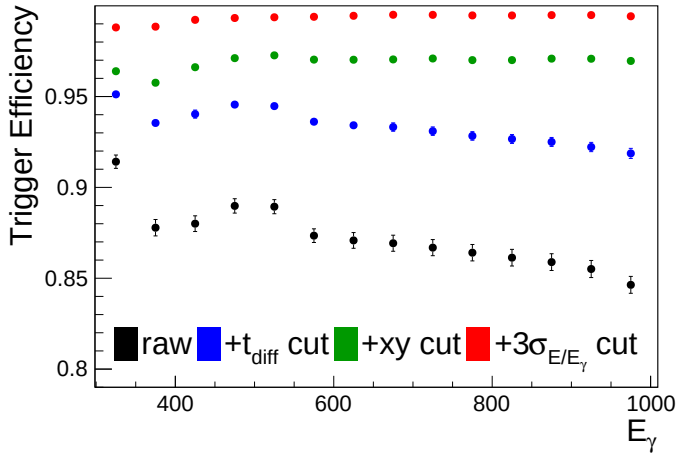

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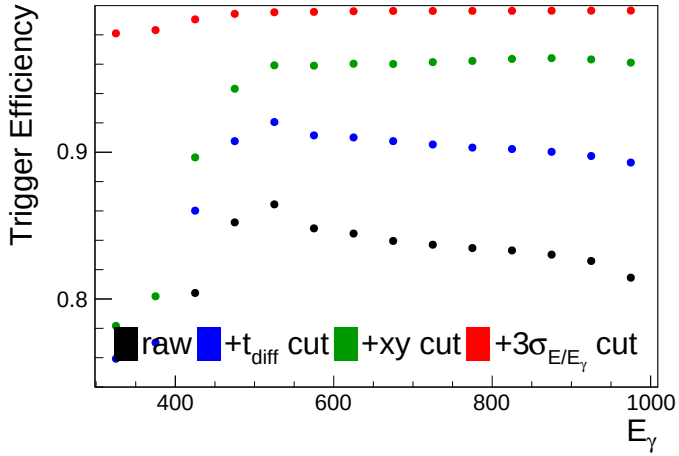

Different σ_{E/E_γ} cuts

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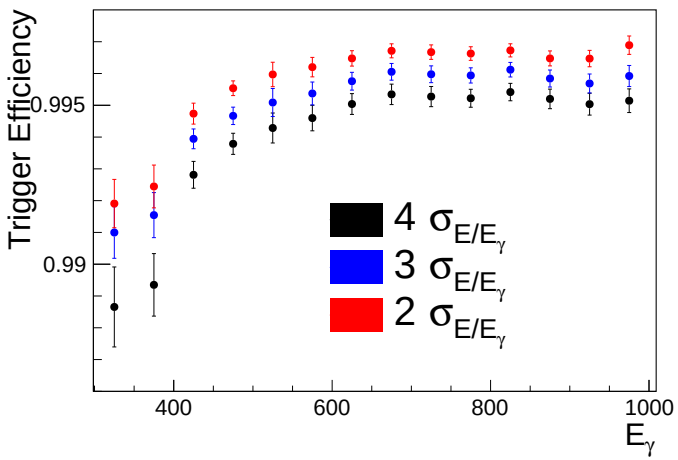

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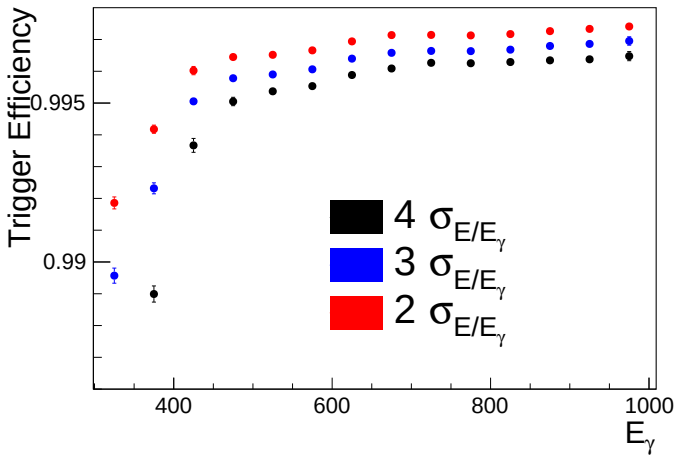

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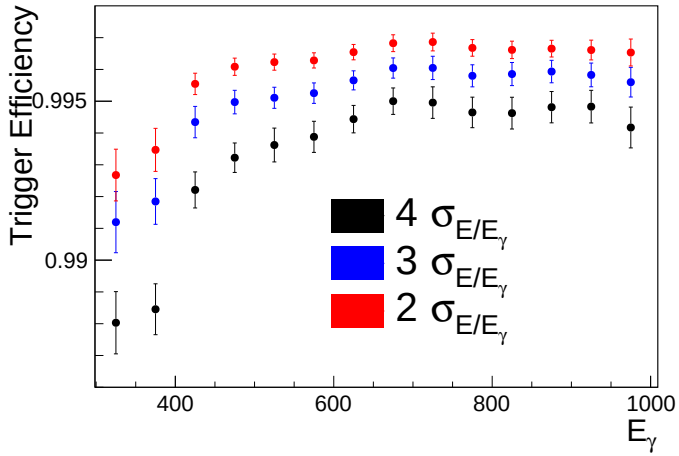

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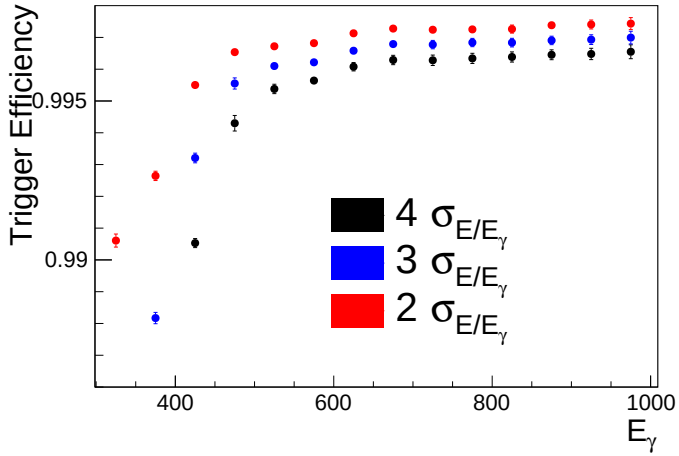

Different Regions for $3\sigma_{E/E_\gamma}$

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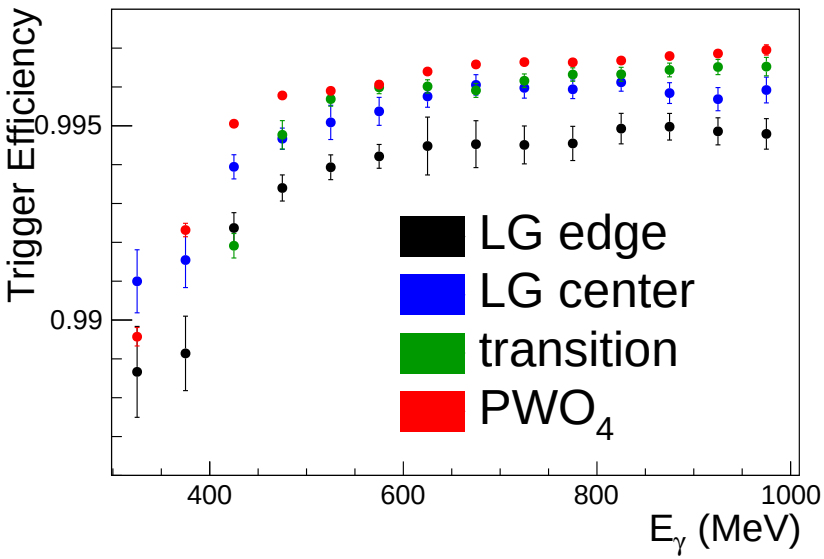

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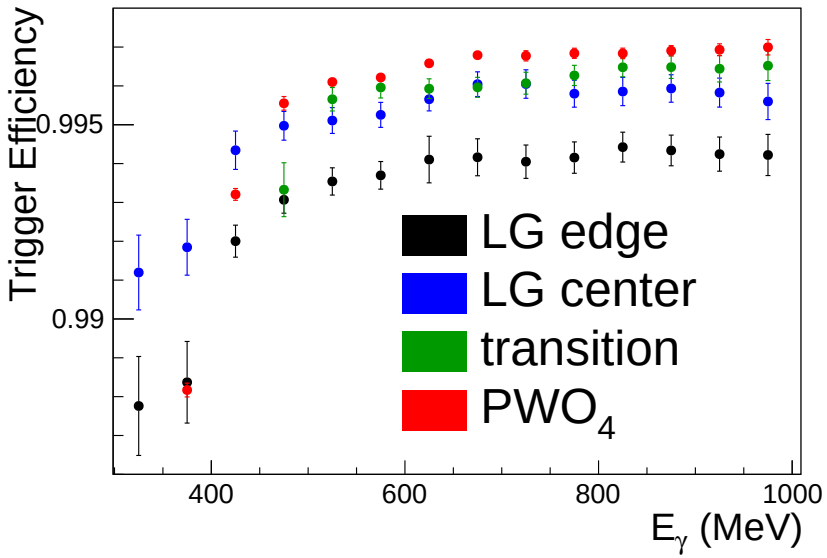

- efficiency $> 99.5\%$ for $E_\gamma > 500 MeV$
- Need a better study at low E_γ for Møller events (extrapolation)