

SLICPandora Jet Energy Resolution for CLIC_SID

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- Sample: $Z \rightarrow uds$
Technical study, no jet reconstruction
 - Energy resolution vs E and $\cos(\theta)$
 - Study the impact of timing cuts later used to handle events with overlay
- Sample: $ee \rightarrow WW \rightarrow \mu\nu qq$
Physics study with and without overlay of $\gamma\gamma \rightarrow \text{hadron}$ background, with jet reconstruction
 - Energy and mass resolution
 - Study the impact of timing cuts

From data calculate rms_{90} and mean_{90}

$$\text{resolution} = \frac{\text{rms}_{90}}{\text{mean}_{90}}$$

$$\Delta\text{resolution} = \frac{\text{resolution}}{\sqrt{N}}$$

Decision between barrel ($\cos(\theta) < 0.7$) and forward region ($0.7 < \cos(\theta) < 0.975$) based on event variable calculated from quark content:

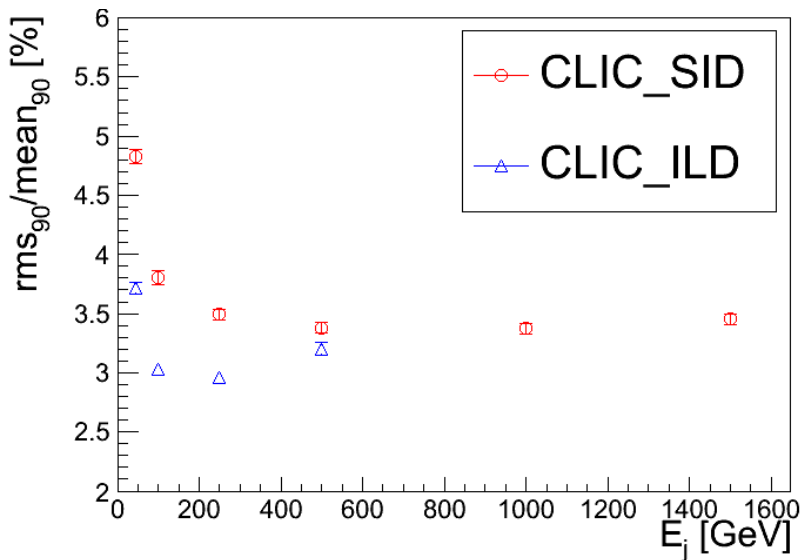
$$\cos(\theta) = \cos(\theta)_{tot} / E_{tot}$$

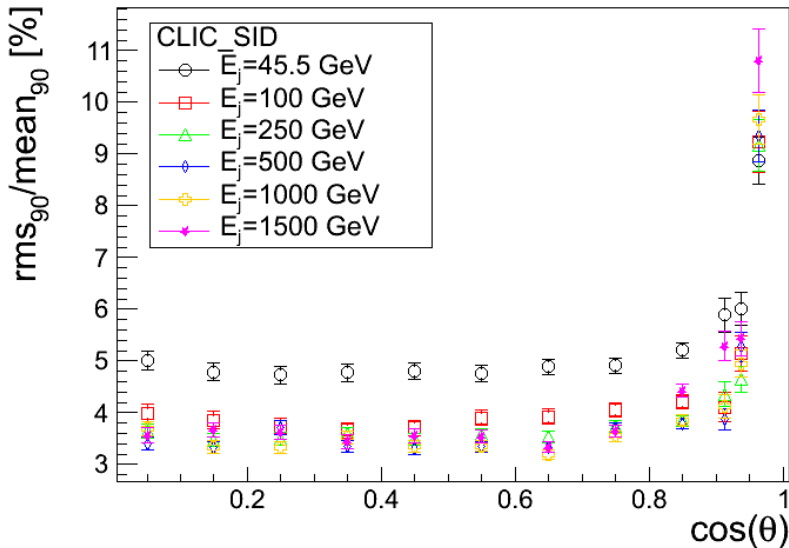
with

$$\cos(\theta)_{tot} = \sum_q \cos(\theta)_q \cdot E_q$$

$$\cos(\theta)_q = |p_z| / p$$

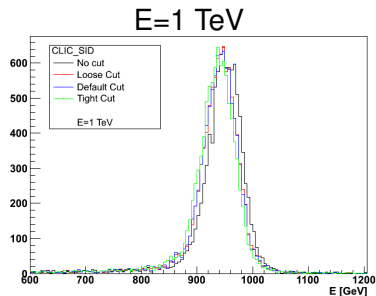
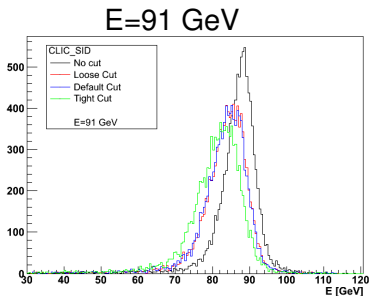
and E_{tot} as total energy in event contained in quark content.



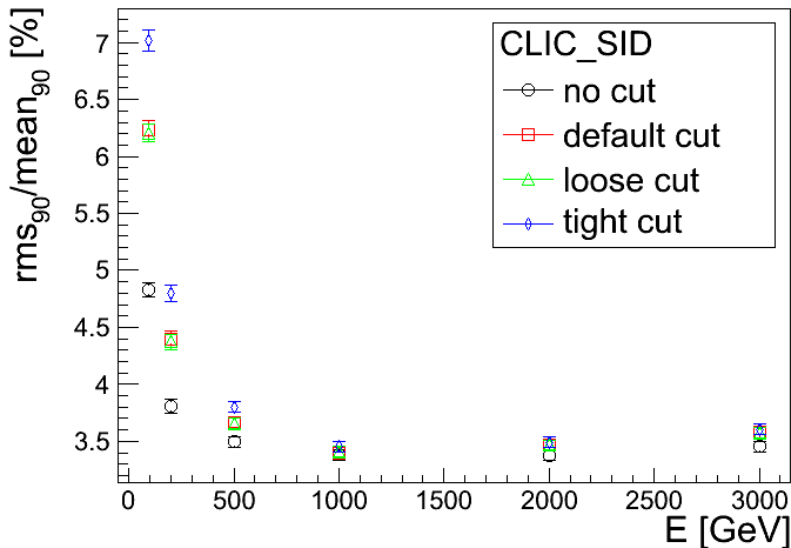


Last bin goes down to 12° but HCAL coverage only to 15.5° .

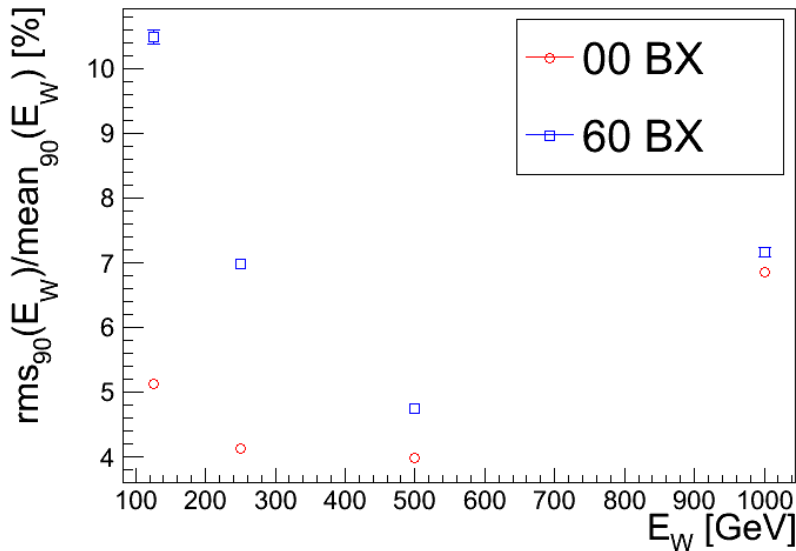
CLICPFOSelector: applies time windows in which measured PFOs are accepted



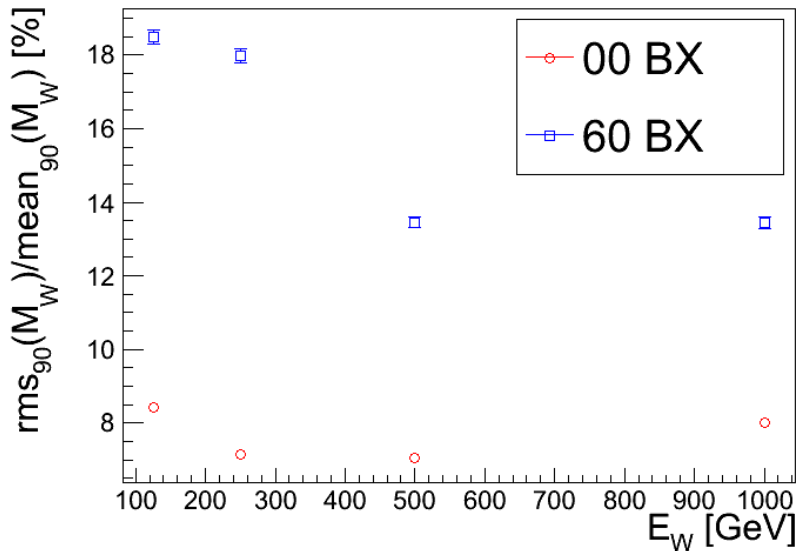
Timing cuts have more impact at lower energies.



Energy Resolution for WW sample (default collection)

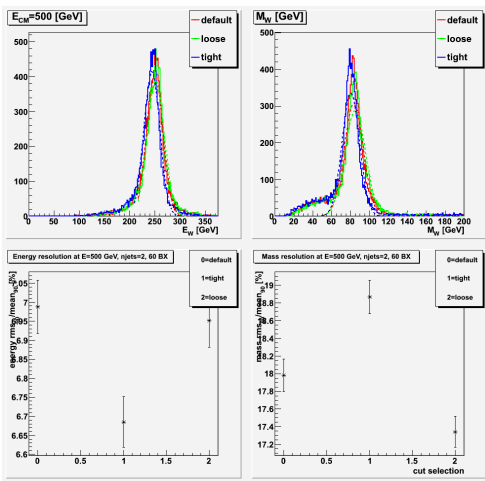


Mass Resolution for WW sample (default collection)



Timing Cuts for WW sample: Example at 500 GeV

The effect of the timing cuts is limited, but more pronounced in the mass resolution.



Goal:

Write a supporting note for the CDR about PFA performance showing results for both CLIC_ILD and CLIC_SID.

Status for $Z \rightarrow uds$:

- Samples processed and analyzed for both detectors
- Results understood

→ More or less finished

Status for $W \rightarrow qq$:

- Samples processed for both detectors
- Analysis more involved due to jet reconstruction and presence of background
- First pass through analysis complete
- Results are new and still need to be discussed

→ Work ongoing