BCAL Segmentation

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HDGeant

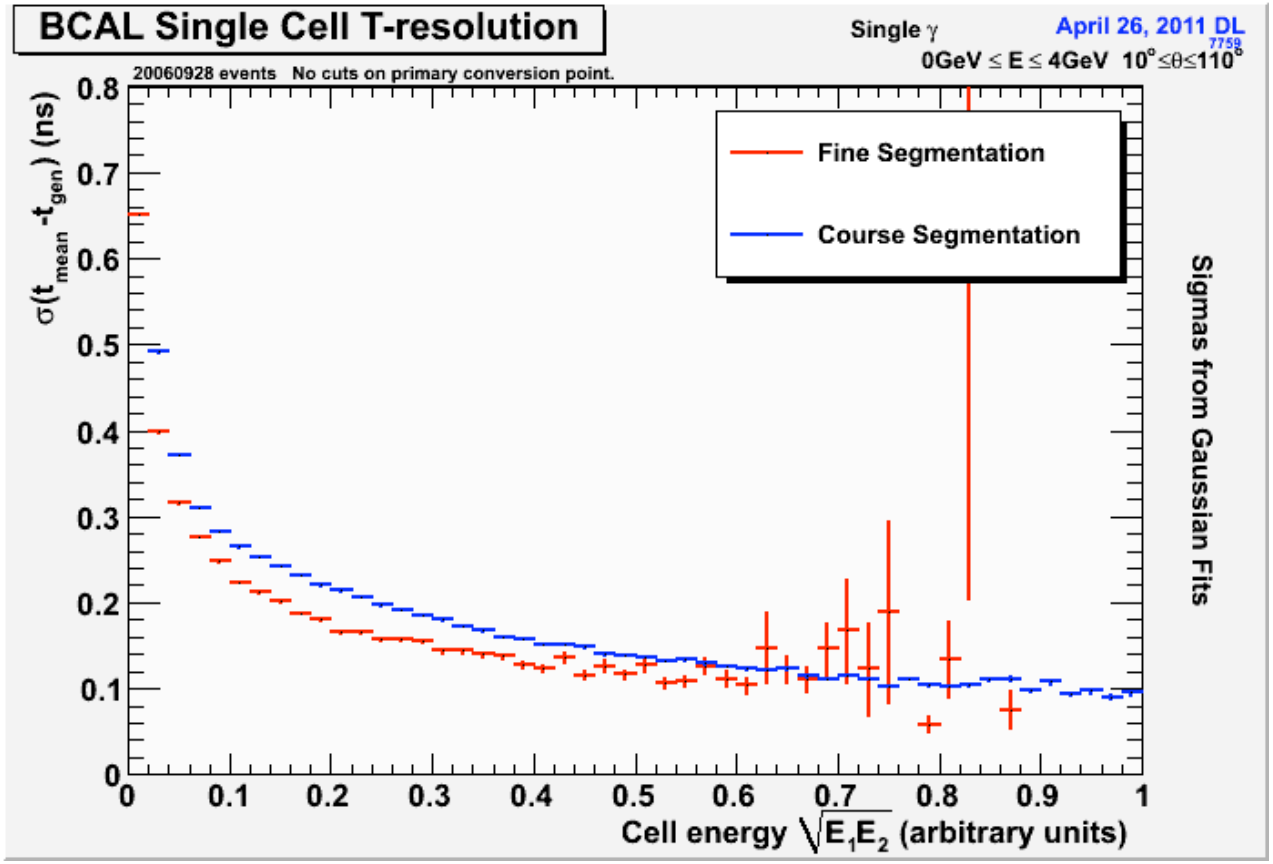
- Cell hit time is energy weighted average for all energy deposited in cell
- gustep calls within 50ns of previous to cell are merged (integrates cell energy)
- Cell hits with less than 1MeV deposited are dropped
- z-local of shower in cell is energy weighted average for cell

mcsmear

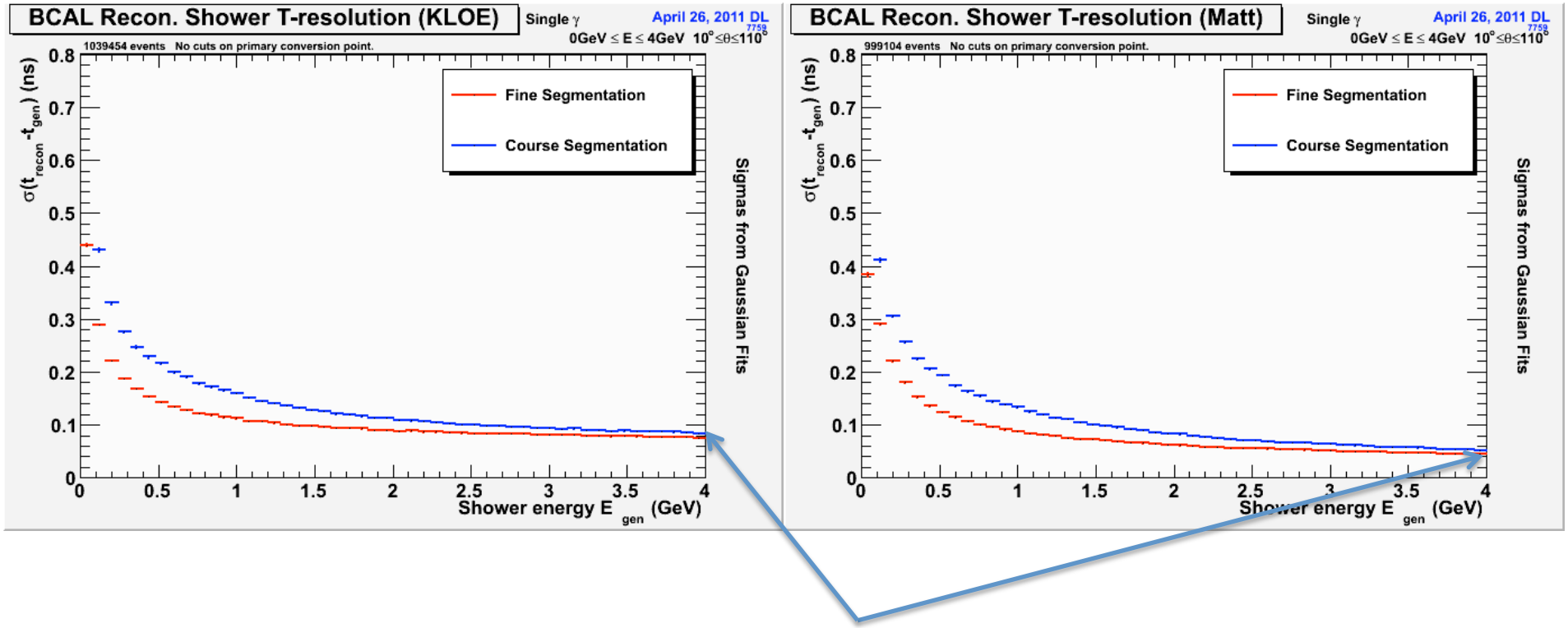
- Cell energy smeared via Gaussian with σ_E=0.042/sqrt(E) + 0.013
- Smeared energy attenuated to each end using z-local (energy-weighted center of shower)
- Smeared time calculated using smeared, attenuated energy that is UN-attenuated back to module center. σ_t=0.01/sqrt(E) + 0.0
- Smeared time shifted using z-local and effective c
- Summed cells (fADC channels) have times from energy-weighted average of smeared, attenuated energies
- Dark pulses for empty SiPMs are added at random times inside 100ns window. These affect the fADC time as they are included in the energy-weighted average
- Dark pulses for “hit” SiPMs have their energy added to total energy, implicitly using the cell hit time.

Single cell timing resolution

Mean time from combining upstream and downstream smeared SiPM times. Plotted as a function of measured energy in the cell using geometric mean of smeared energies seen by each SiPM



Reconstructed Shower Timing Resolution



Matt's algorithm appears to do better than KLOE

Efficiency

KLOE

Matt

3σ

5σ