# **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  $\sigma_{\rm E}$ =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.  $\sigma_t$ =0.01/sqrt(E) + 0.0
- Smeared time shifted using z-local and effective c
- Summed cells (fADC channels) have times from energyweighted 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



