

Clustering Algorithm for Long Crystal Bar ECAL

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Motivation

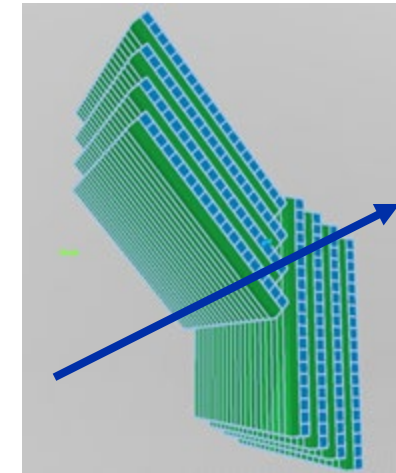
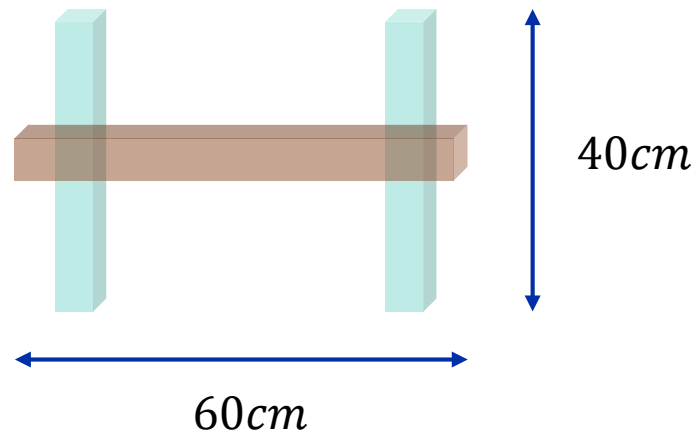
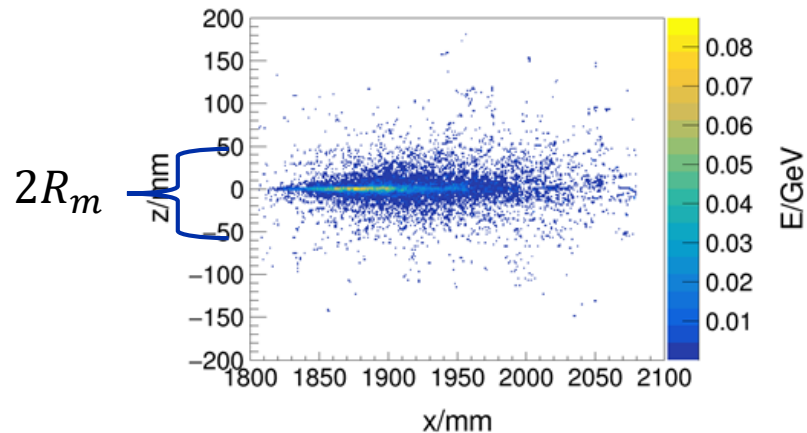
Identification of energy deposits from each individual particle

Clustering algorithm is the first one of the three main sub-algorithms

1. large lateral width of electromagnetic shower in crystal
2. connection of vertical and horizontal units by accident
3. stave structure for ECAL

1. Clustering
2. Particle recognition
3. Energy splitting

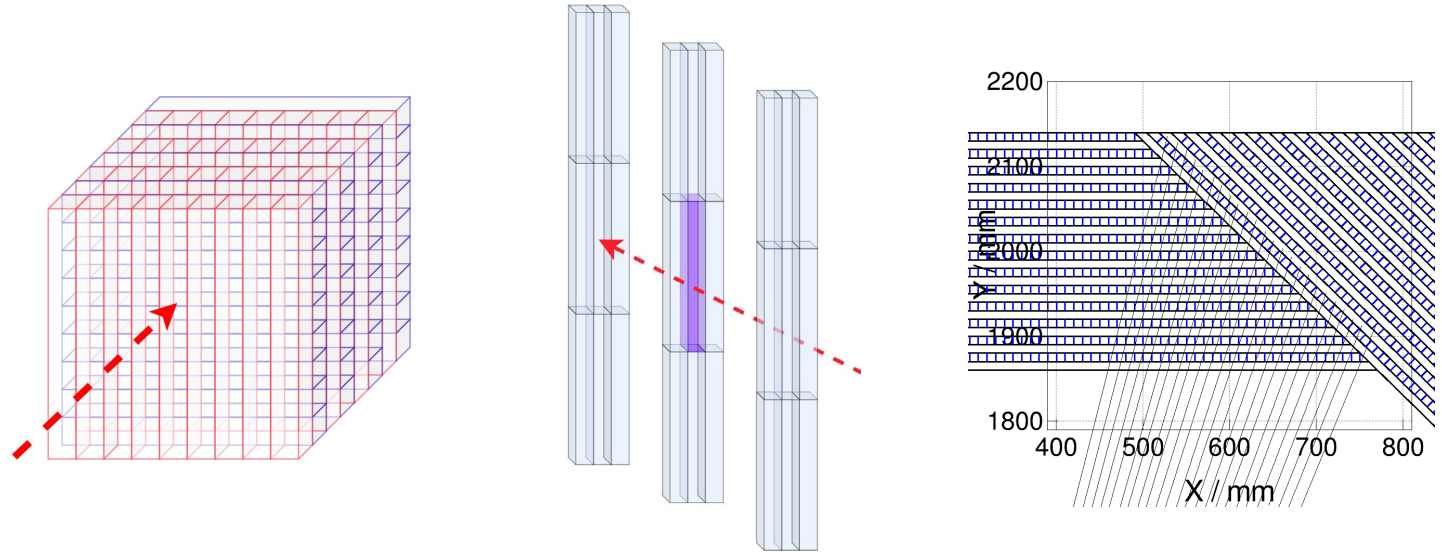
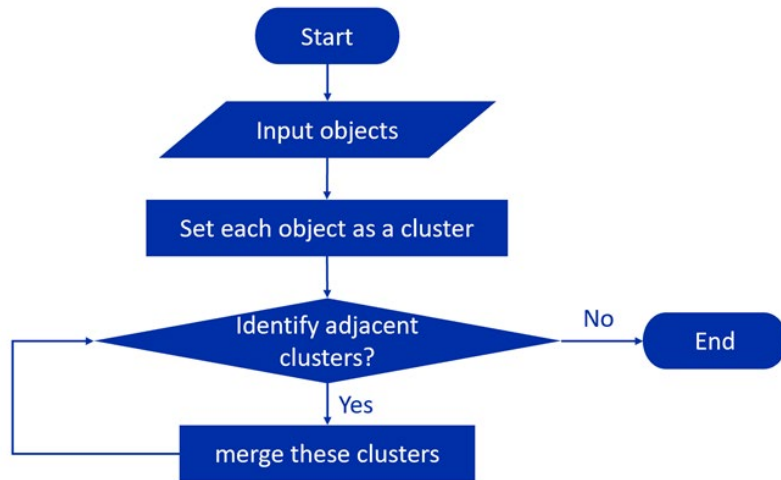
Reconstruction algorithm



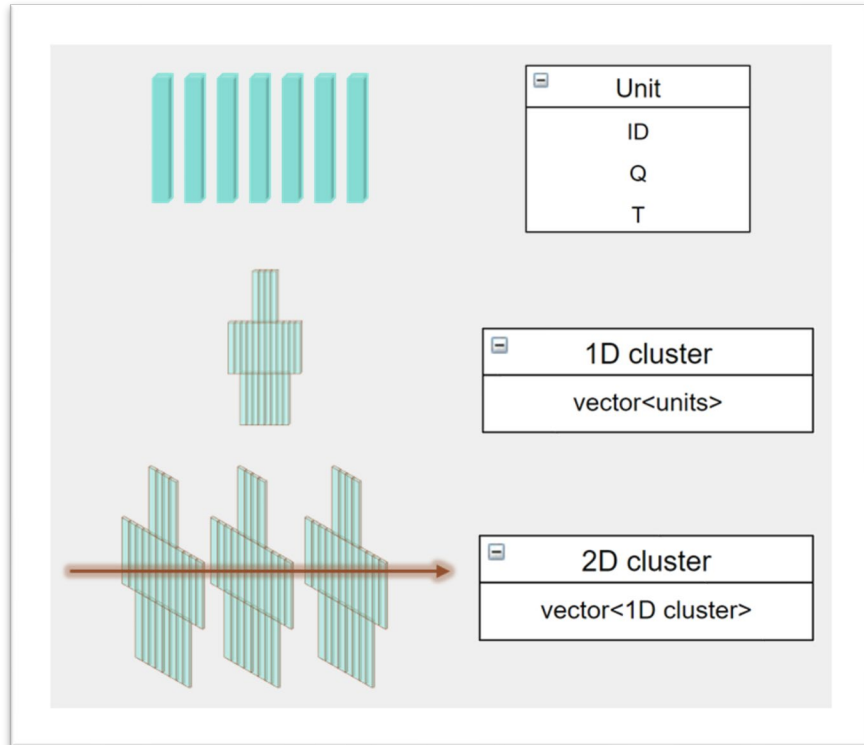
Design of clustering algorithm

A cluster is a group of adjacent units whose energy is greater than noise threshold

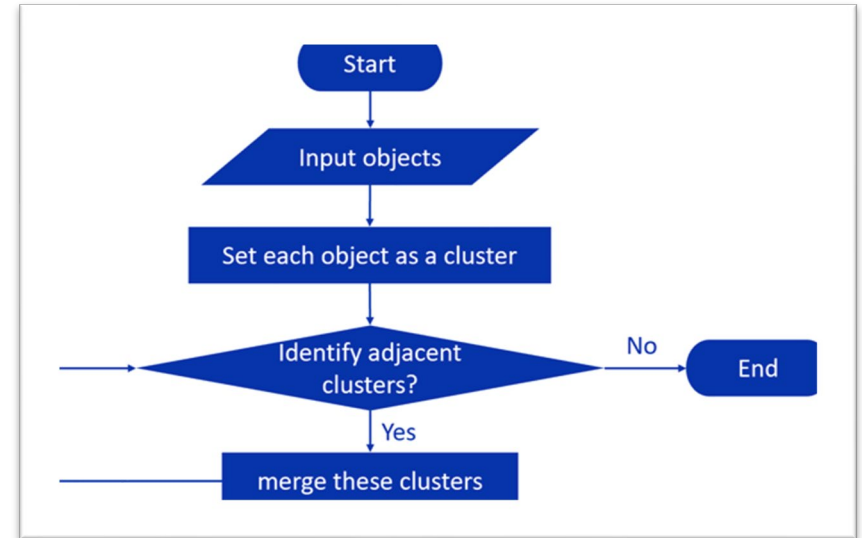
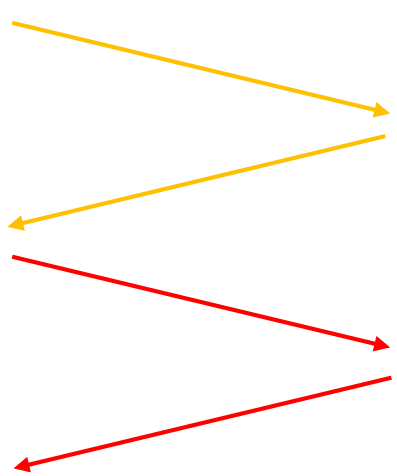
1. agglomerative clustering based on identifying if adjacent
2. vertical and horizontal units are clustered respectively
3. any two units that share a common side or corner are considered as adjacent
4. over module: dictionary lookup method



Execute clustering algorithm

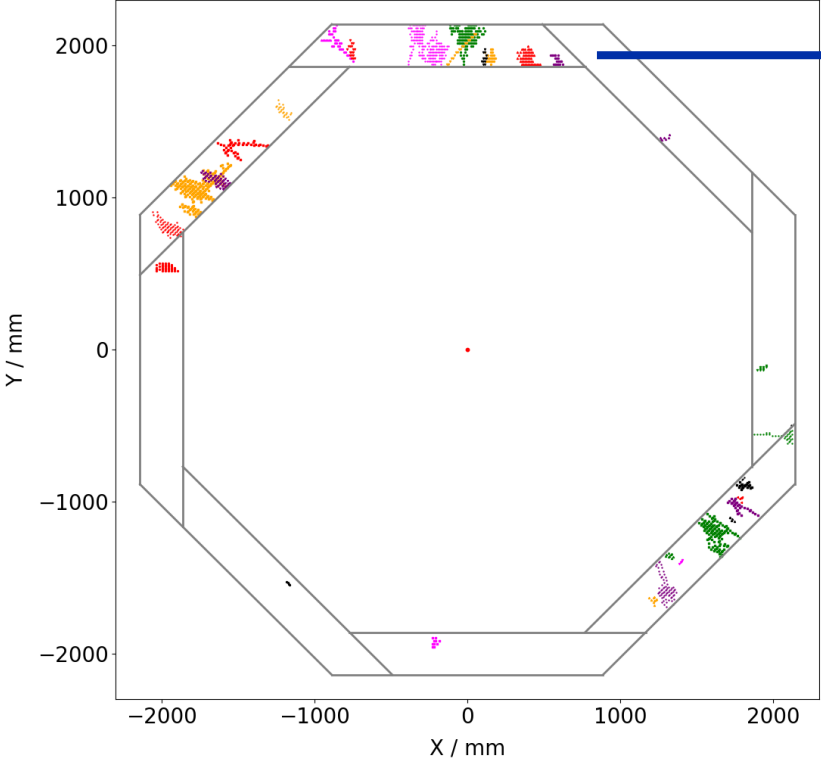


Data Collection



Clustering Algorithm

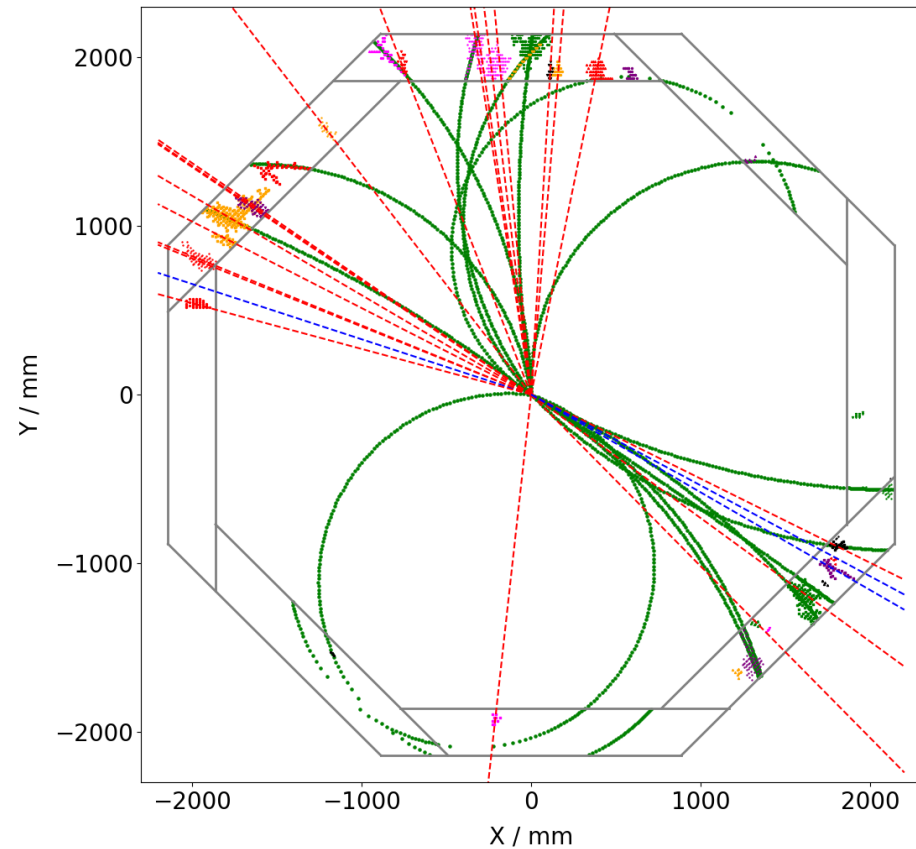
Clustering results



$$H \rightarrow b\bar{b}$$

Points of different colors indicate a single cluster

Match



green curve line: track extrapolation

dashed red line: direction of photons from truth

dashed blue line: direction of neutral hadron from truth

need to track match and particle recognition

Z direction

