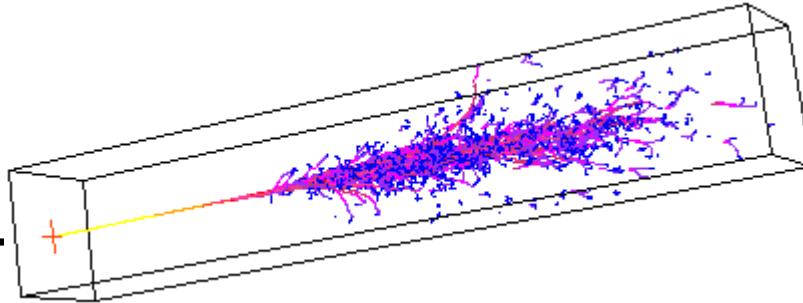




MLC4



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Calorimetry

- Use a dense and scintillating material to stop the particle
 - Measure the light/energy that is emitted while the particle is being absorbed
 - I like to think about a bullet in ballistic gel



The FCAL

- A roughly circular detector comprised of 2800 lead glass blocks
 - Each block is 68% Pb by weight



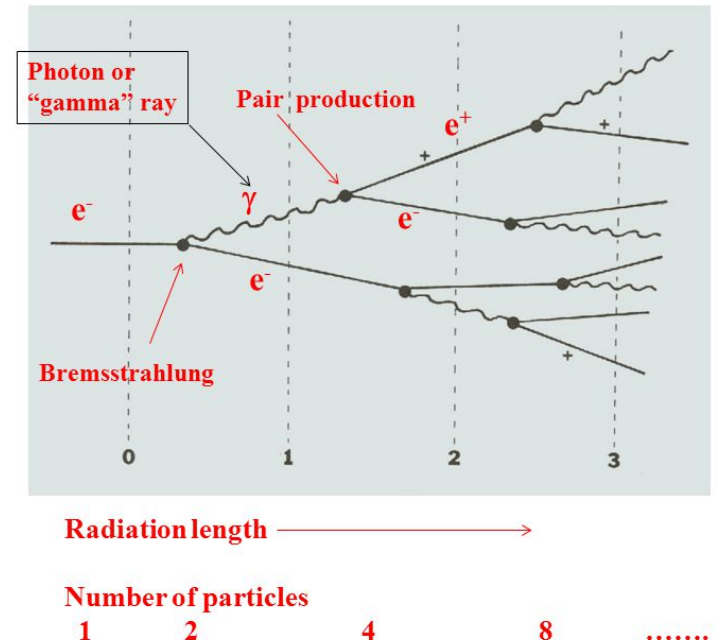
Hits to showers

- As a particle traverses the crystal it loses energy by knocking the heck out of what ever it hits.
- This causes a cascade.
 - Called a **shower**
- The detector is read out on a brick by brick level and a shower often covers many bricks



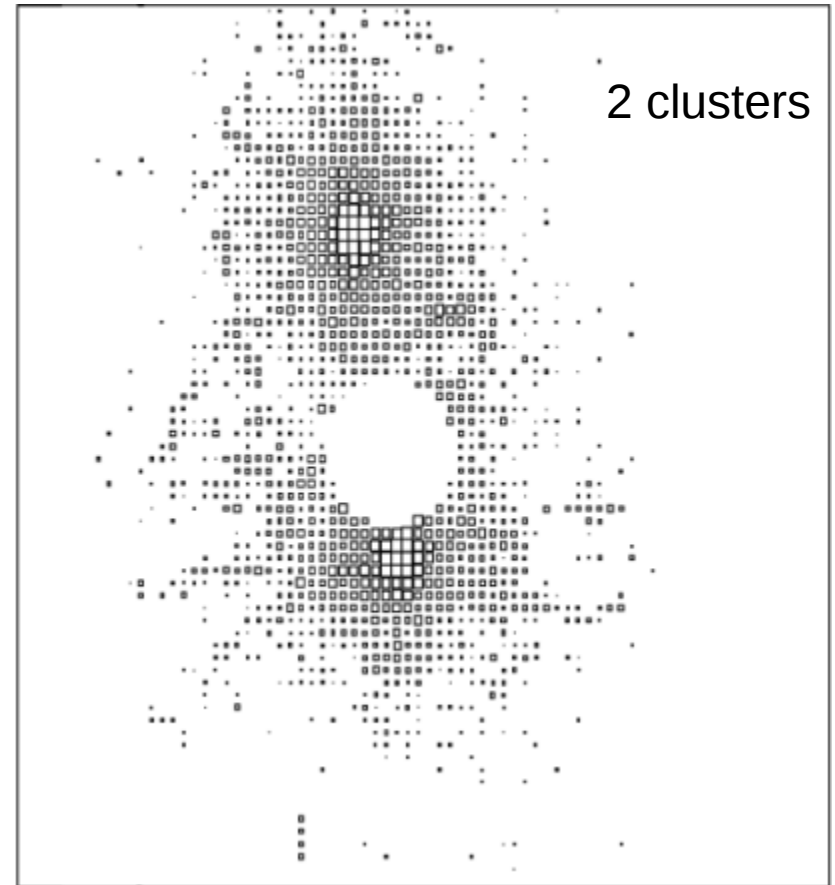
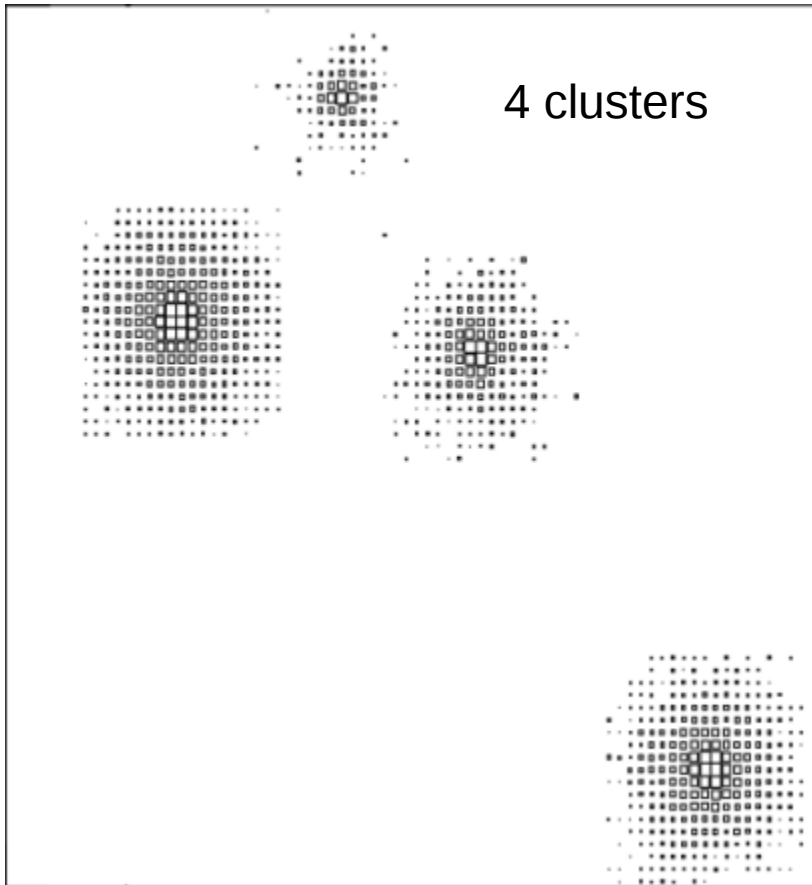
Calorimetry and Showers

The longitudinal (depth) development of an electromagnetic shower



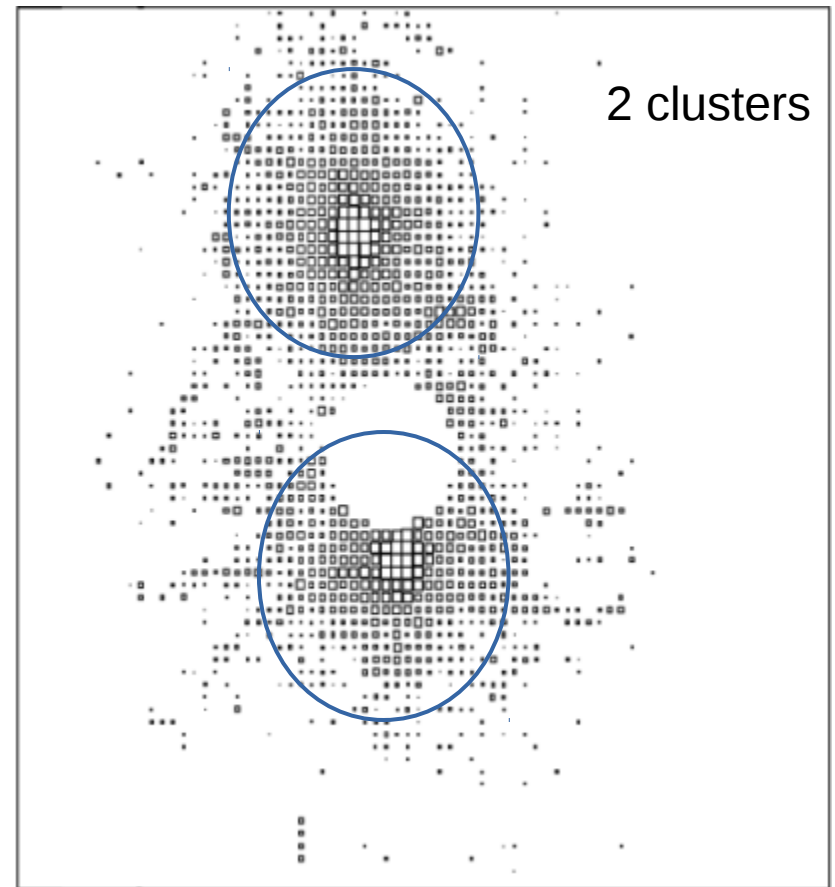
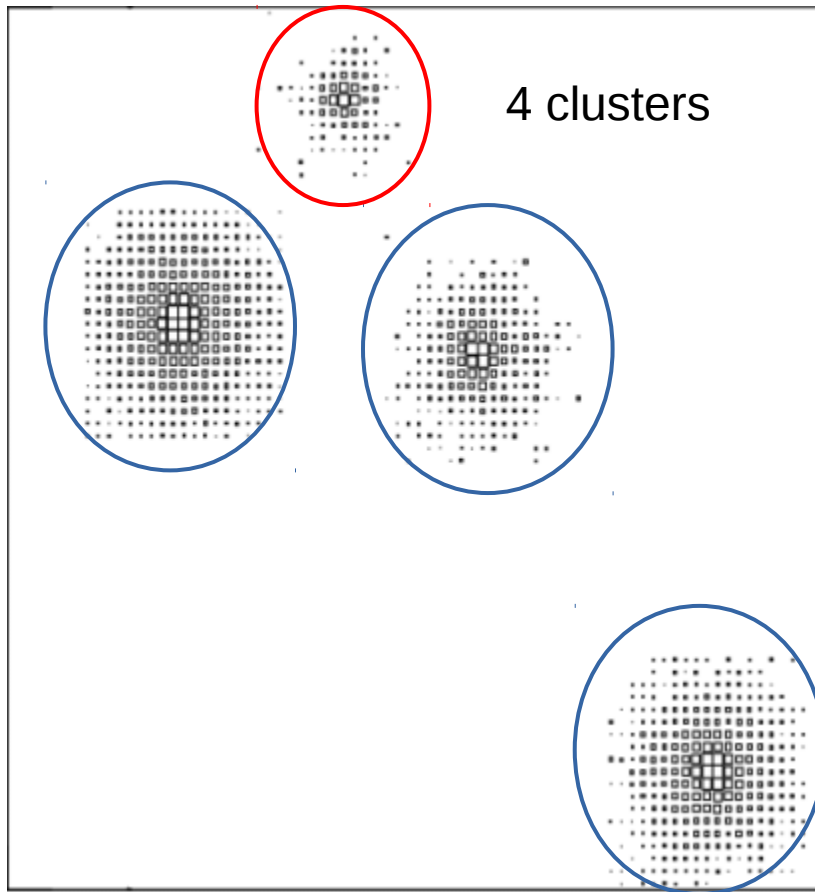
Not the FCAL

- Hits can be grouped together to form clusters
 - Each cluster is a shower



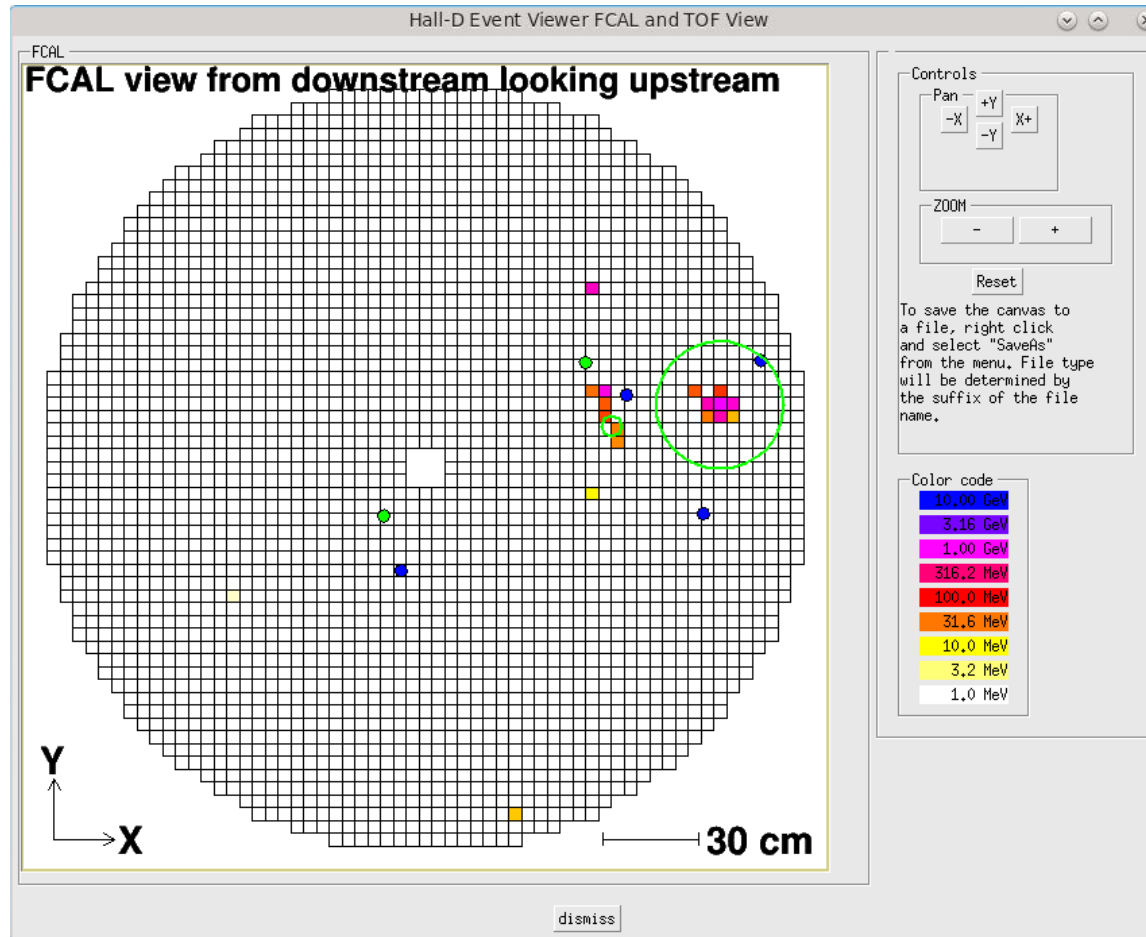
Not the FCAL

- To be extra tricky there are two main classes of clusters: hadronic and electromagnetic



The challenge

- Perform the clustering and classification on real GlueX data for the forward calorimeter



Materials

- A set of ~400k events
 - Broken into two files
 - Each row contains comma-separated values
 - Blocks of 4 values (4 values per hit)
 - x,y,E,t
 - Position, Energy, time
- A tiny set of 18 events which are of the same format as above
 - Another file with 18 rows with “labels” in the proper format for a perfect submission
- A Jupyter notebook to aid in visualizing the data

Valid Submission

- A test set will be released on April 29th. Final submission will be due May 1st
- A valid submission will consist of a text file with one row for each row (event) in the test set.
 - Each row of the submission will consist of **3 comma separated** integers representing, from left to right
 - Number of EM showers, Number of hadronic showers, total number of showers

Where do I go to get started?

- https://halldweb.jlab.org/talks/ML_lunch/Feb2020

You have until May 1st...

Good luck!