



ZDC Simulation

December 12th, 2024

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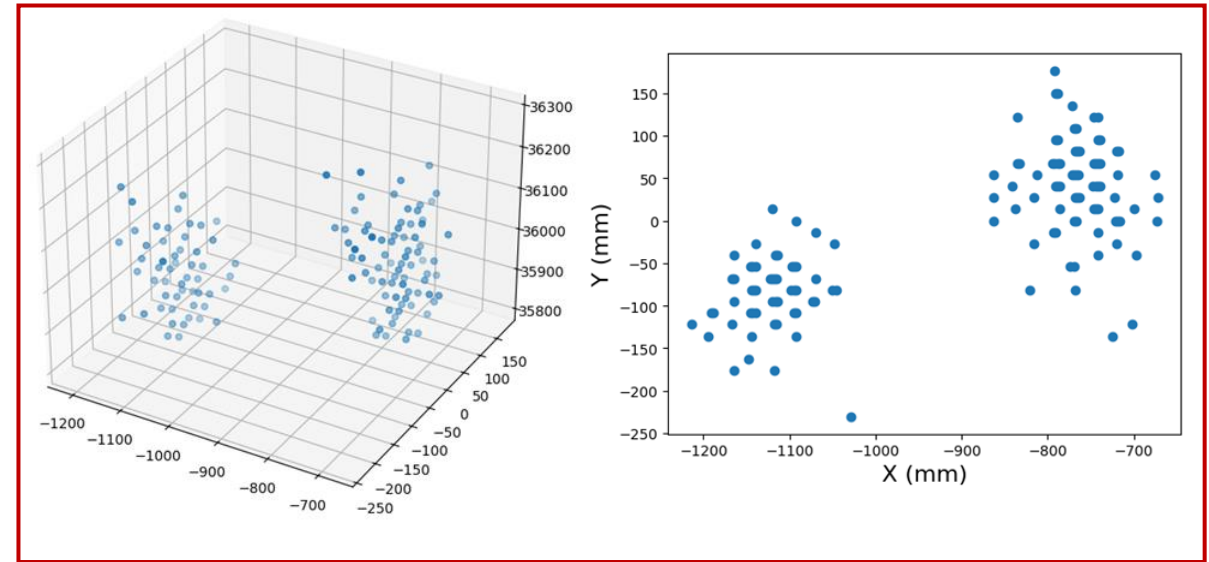
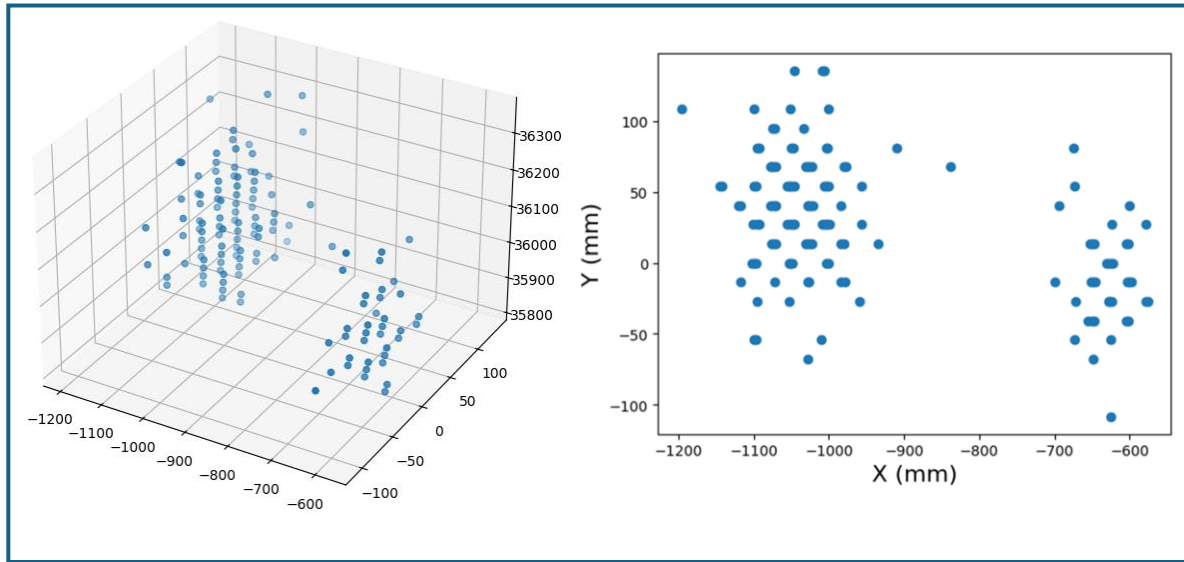
(Sejong University)

Classification

π^0 reconstruction



Two γ classification



Classification

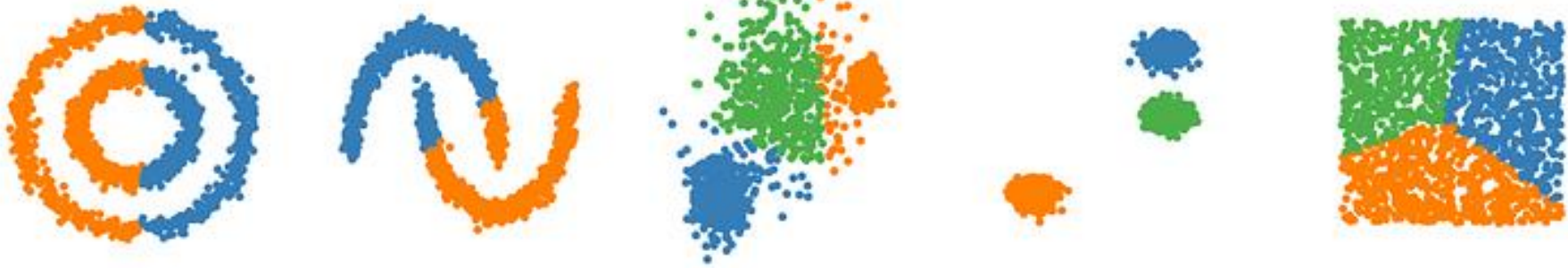
UCONN

DBSCAN

(Density-based)

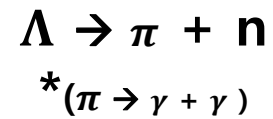


k-means
(Distance-based)

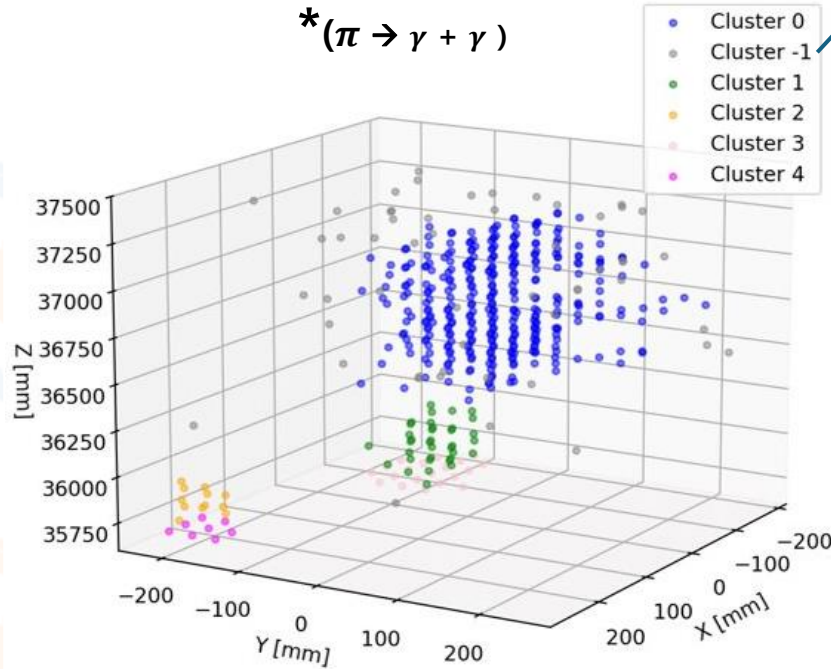


Classification

UCONN



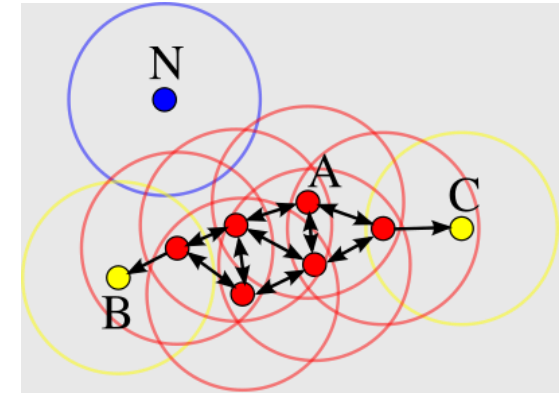
DBSCAN
(Density-based)



ePIC-ZDC discussion meeting
10/17/2024 Gursimran Kainth

k-means
(Distance-based)

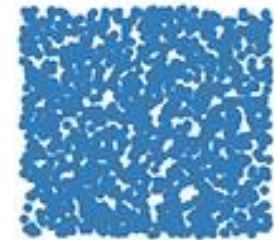
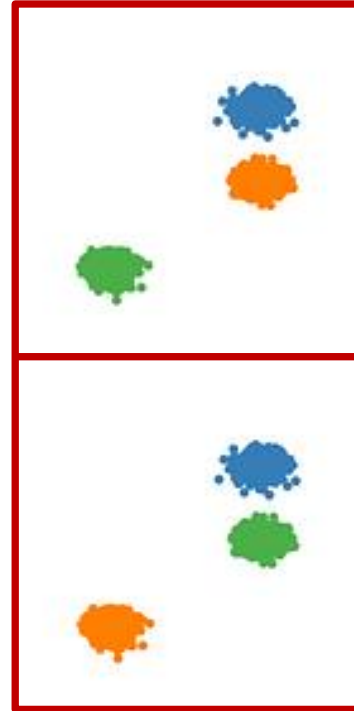
noise



- Parameter (radius, minimum Samples)
- Do not require the number of clusters in the data to be specified a priori
- Can find arbitrarily-shaped clusters.
- ...

Classification

~~DBSCAN~~ UCONN



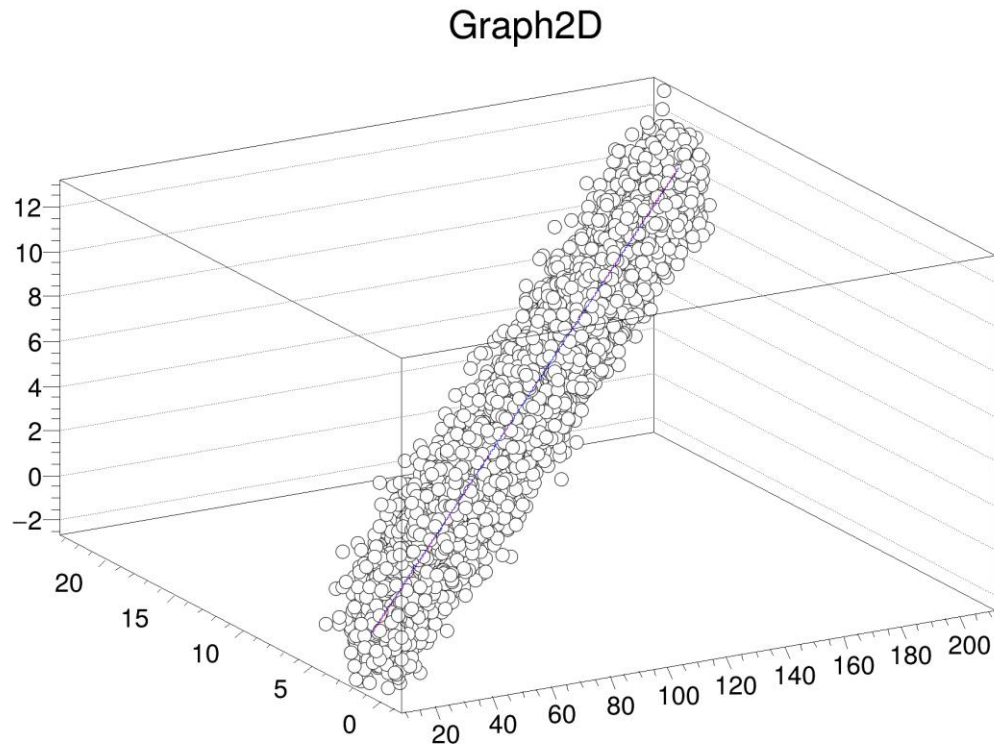
k-means
(Distance-based)



- Fixed the number of clusters

Fitting

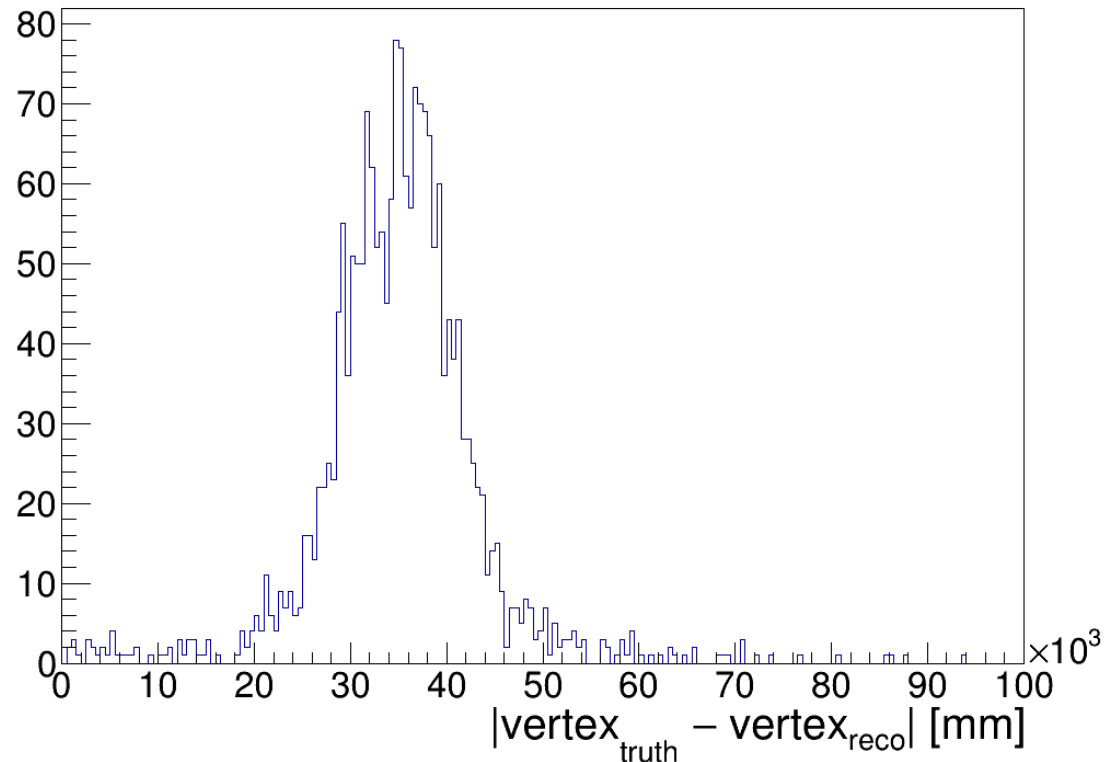
- Fitting of a TGraph2D with a 3D straight line



```
//implementation of the function to be minimized
// calculate distance line-point
double distance2(double x, double y, double z,
const double *p,double w) {
// distance line point is D= | (xp-x0) cross ux |
// where ux is direction of line and x0 is a point in the line (like t = 0)
XYZVector xp(x, y, z);
XYZVector x0(p[0], p[2], 0.);
XYZVector x1(p[0] + p[1], p[2] + p[3], 1.);
XYZVector u = (x1 - x0).Unit();
double d2 = ((xp - x0).Cross(u)).Mag2();
return w*d2;
}
```

$$* W_i = \frac{\text{hit}_{-}E_i}{E_{\text{total}}} \text{ (energy weight)}$$

Secondary vertex reconstruction



- it is impossible to find the decay position using only Hcal

$$* W_i = \frac{\text{hit}_{E_i}}{E_{\text{total}}} \text{ (energy weight)}$$