FTBF-2023 Thin Gap tracking detector studies

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eRD-108 meeting

10/05/2023

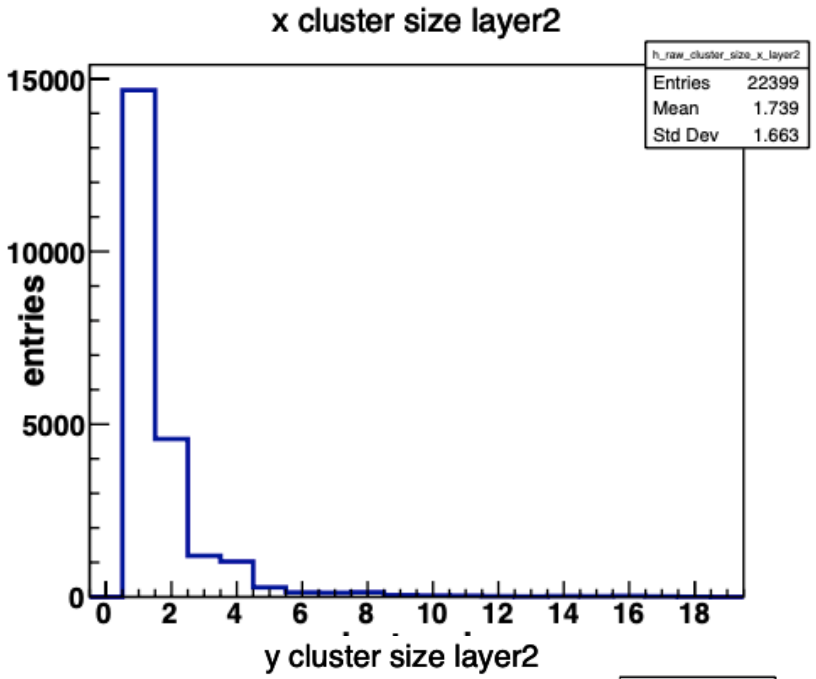
FTBF thin gap prototypes –Vanderbilt

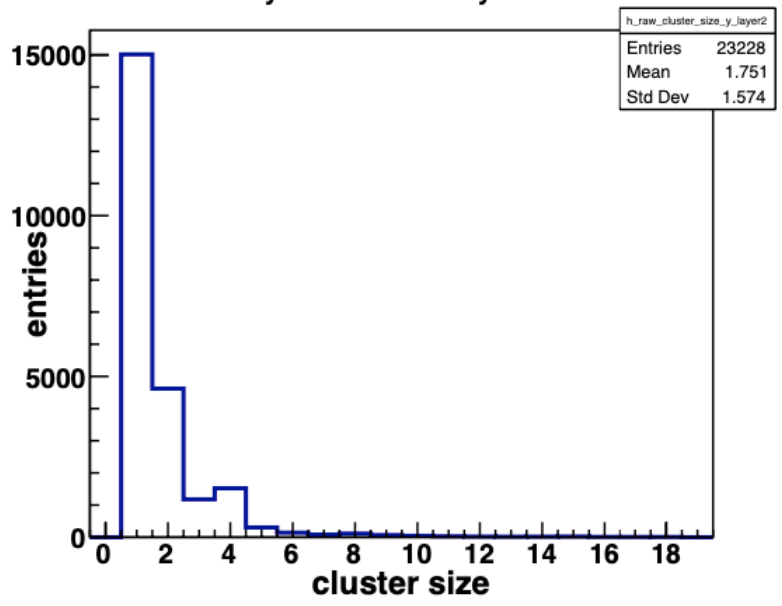
- Prototypes in test beam

  1. GEM +mRwell prototype : 1mm + 0.5 mm drift and transfer gaps
  2. GEM + MMG prototype : 1 mm + 1 mm drift and transfer gaps
  3. Single thin gap mRwell prototype : 1 mm drift gap

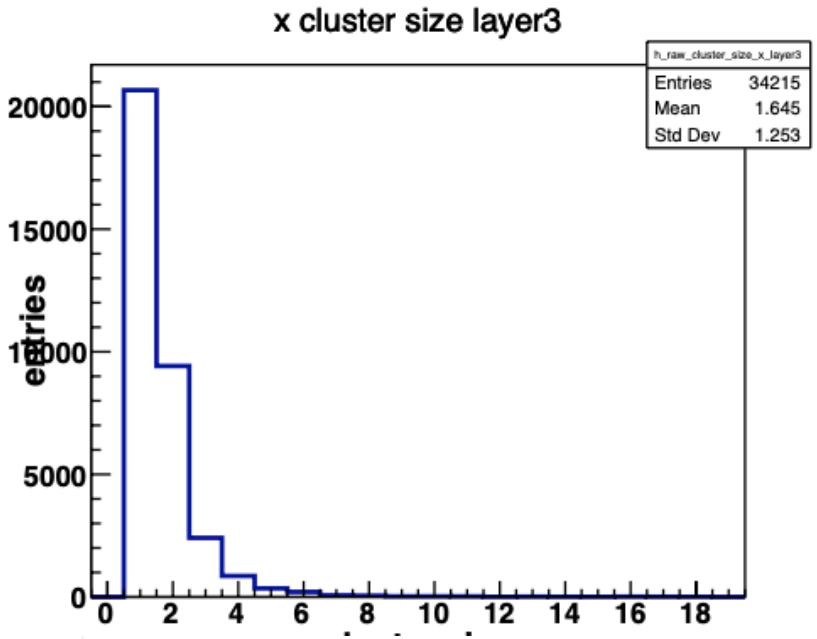
- Test beam had data from prototype 1 and 2. Nothing from prototype 3.
- All three prototypes has chevron R/O with 1.6 mm pitch. Total 128 channels (64 X + 64 Y) over 10x10 cm^2 active area.
- Very preliminary result on estimated efficiency in KrCO2 during HV scan.
- Setup : 2 front GEM trackers + 3 thin gap prototypes + 2 back GEM trackers

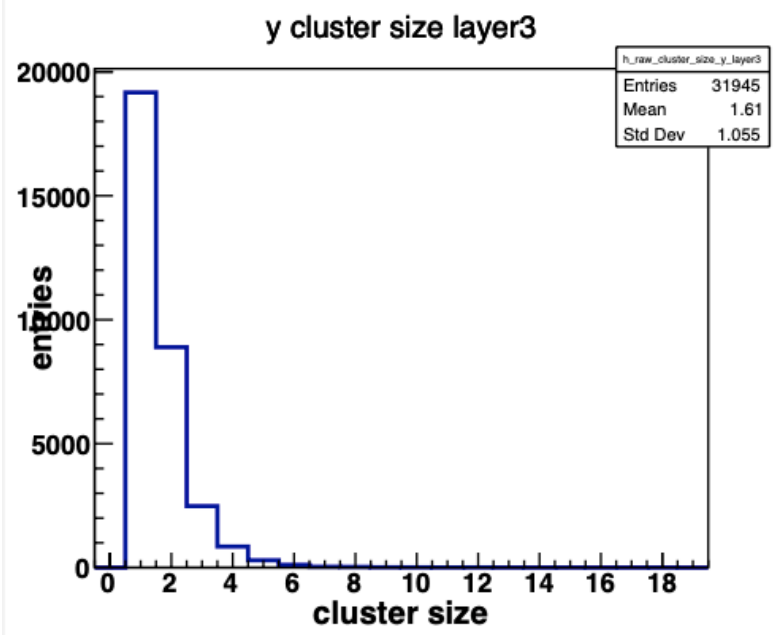
GEM+MMG





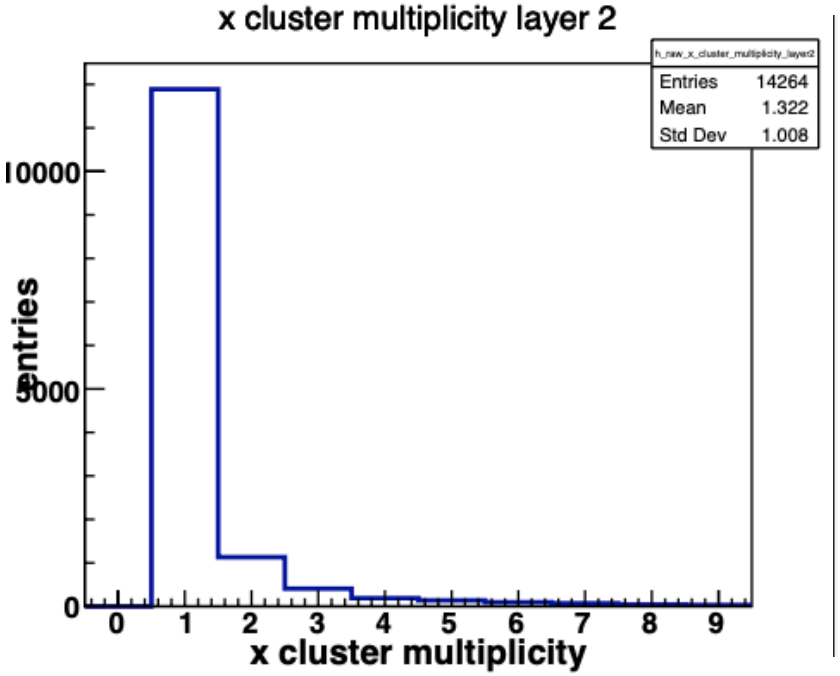
GEM+mRwell

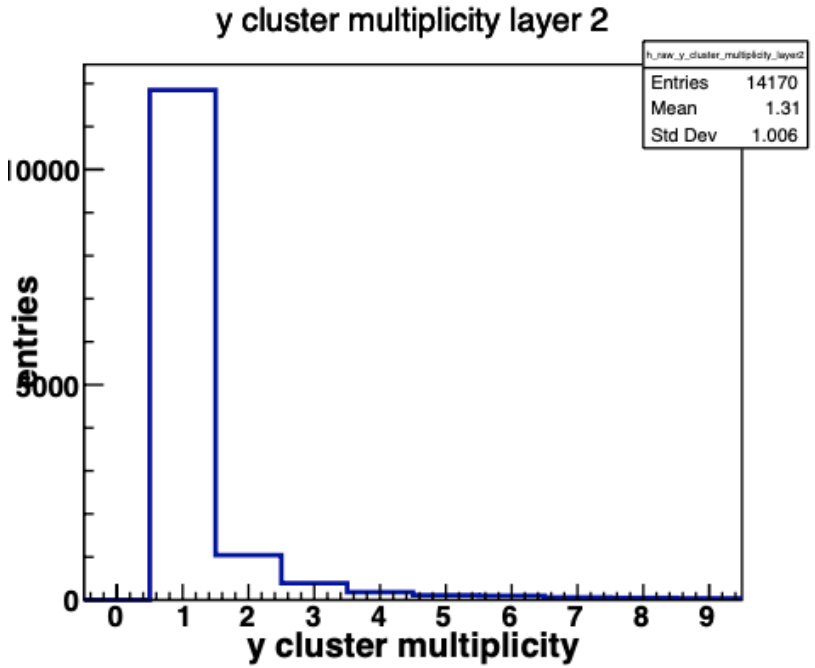




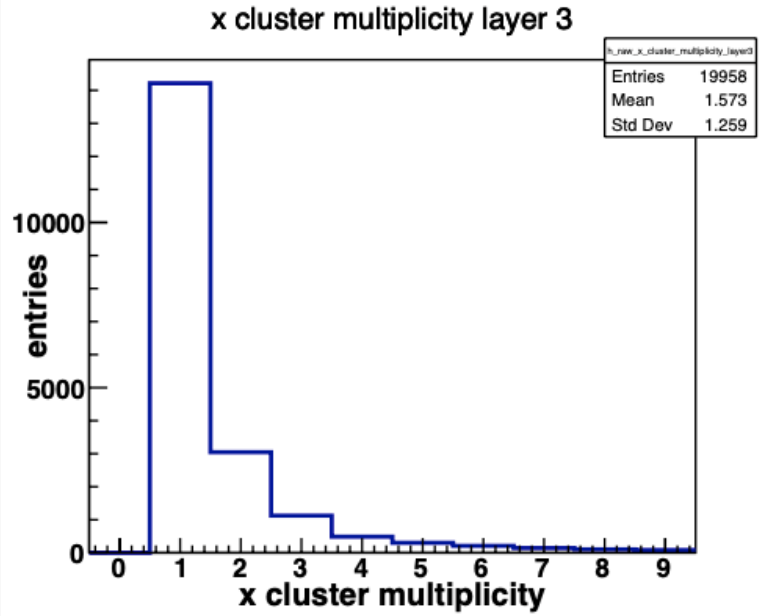
- Mostly 1 strip is fired as compared to an average of 3 strips in triple GEM trackers.

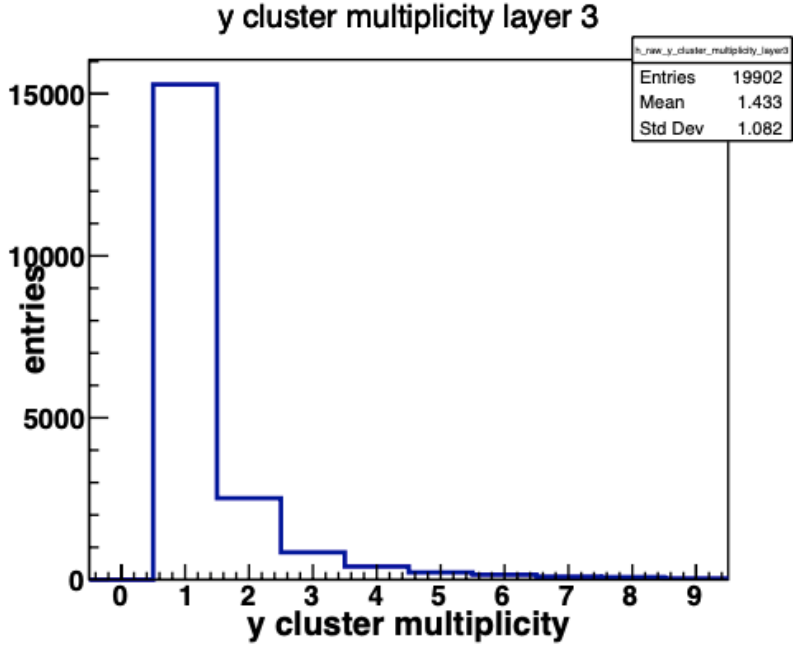
GEM+MMG





GEM+mRwell

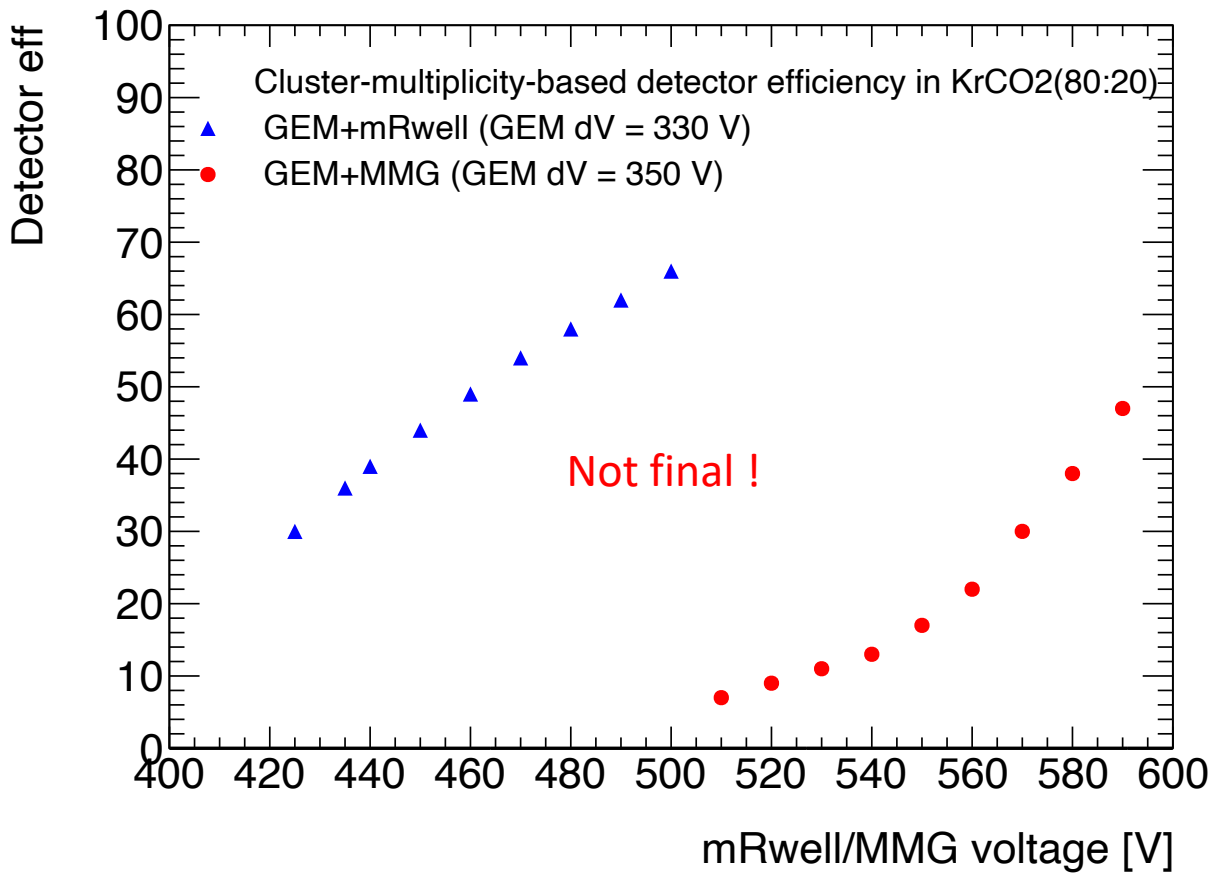




- Most of the events has single clusters as expected.
- Use the entries in the histograms along with total triggered events to estimate cluster based detector efficiency.

$$\text{Eff.} = \frac{Entries\ in\ cluster\ multiplicity}{total\ triggered\ events}$$

Cluster-multiplicity based detector efficiency



To do list :

- Need special treatment for pedestal on these prototypes
- Need to estimate tracking based efficiency.
- Process all the runs
- Estimate spatial resolution for various track angles.