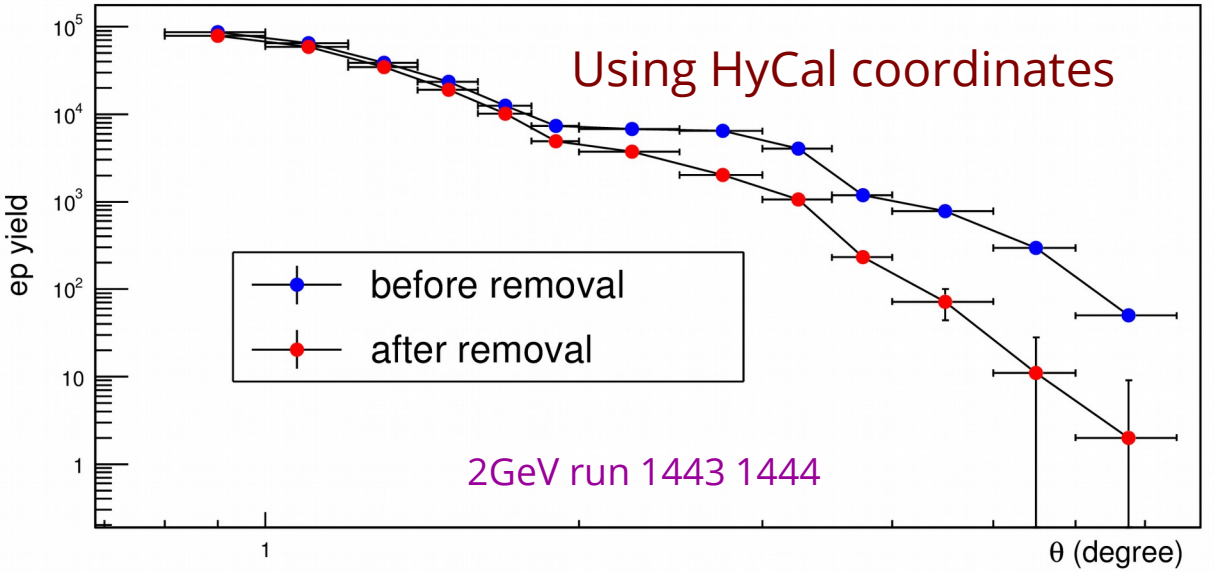
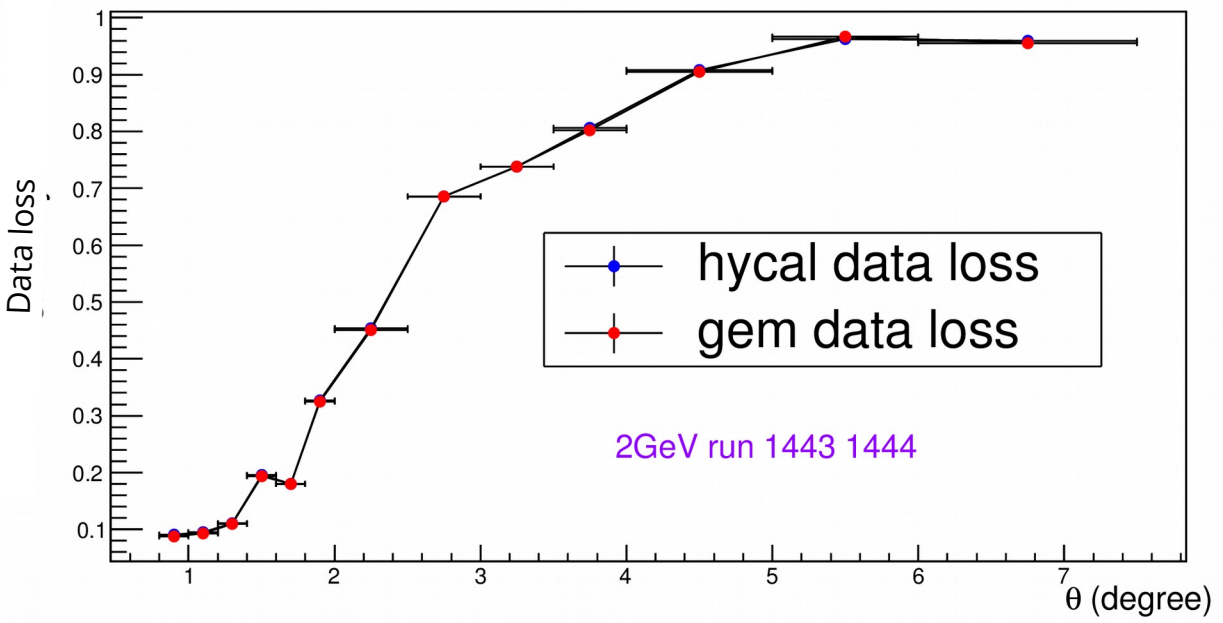
Cosmic removal

- Cosmic removed data from Duke group
- Ep yield before and after cosmic removal

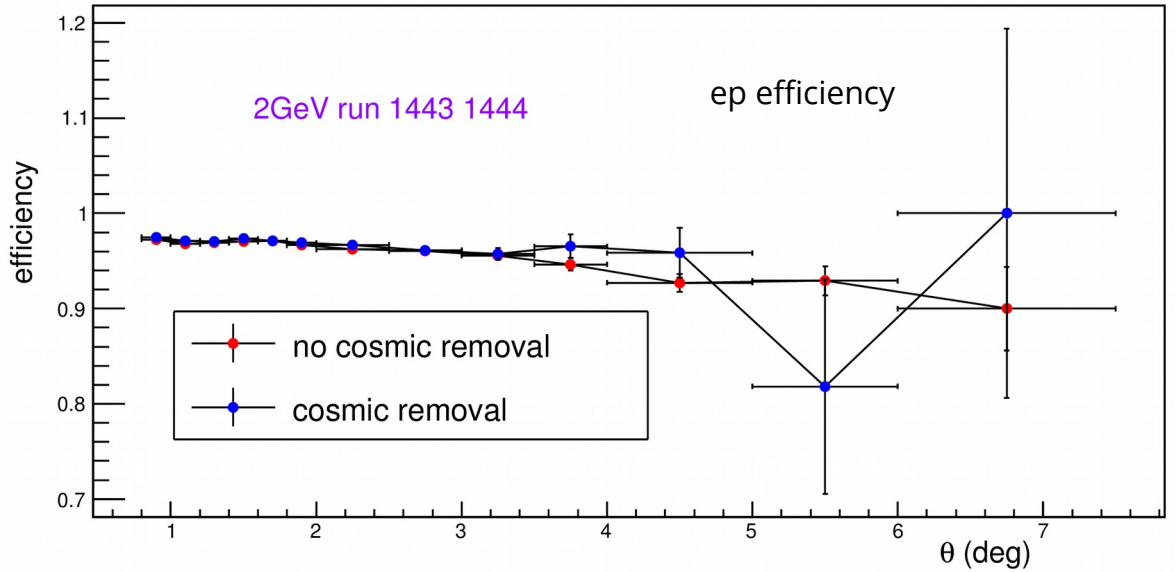


$$data\ loss = \frac{\#\ of\ cosmic\ events}{total\ events}$$

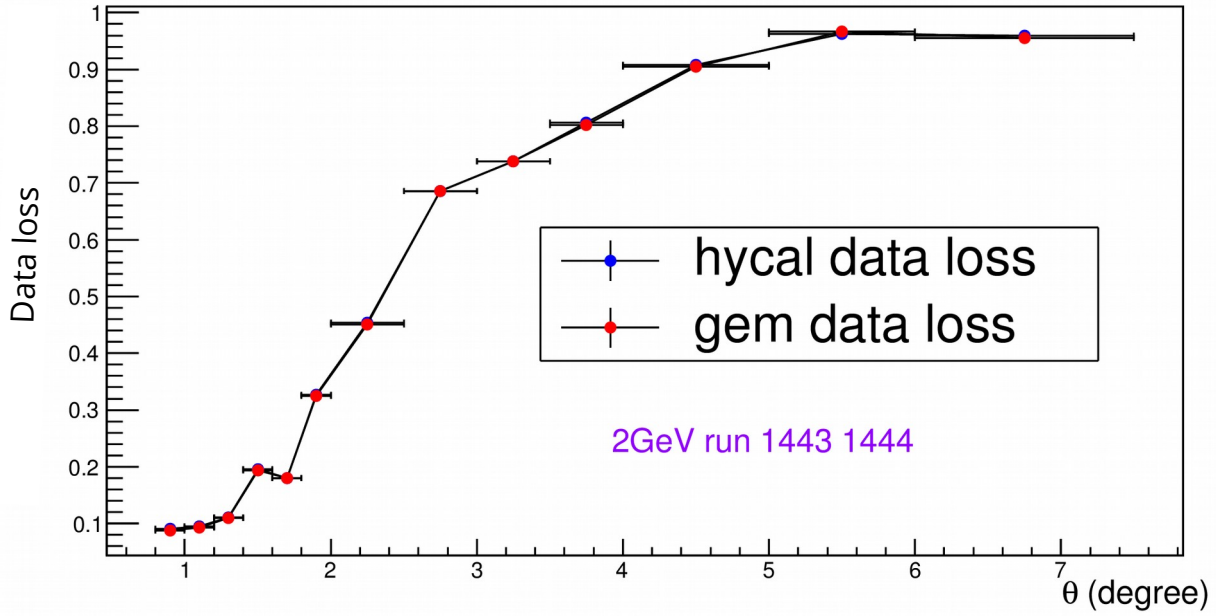


Cosmic removal

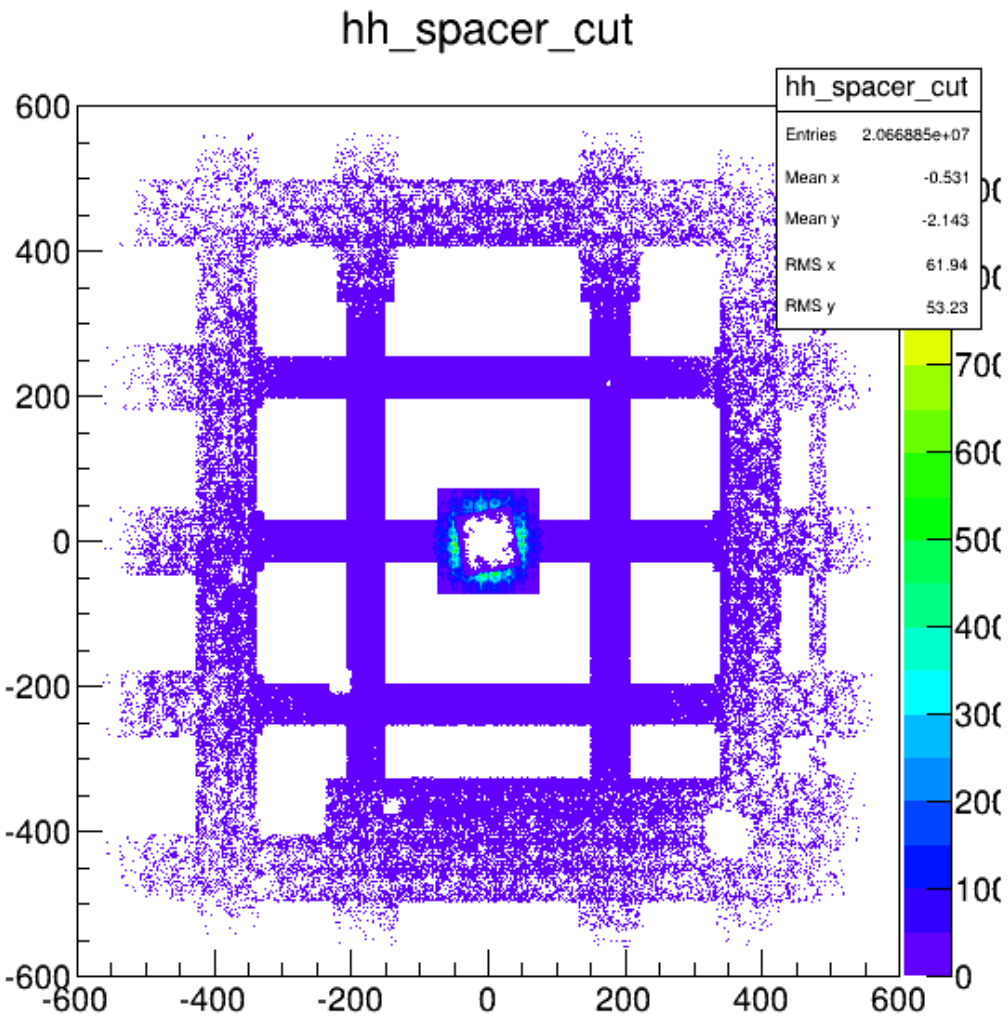
- Cosmic removed data from Duke group
- Efficiency compare before and after cosmic removal



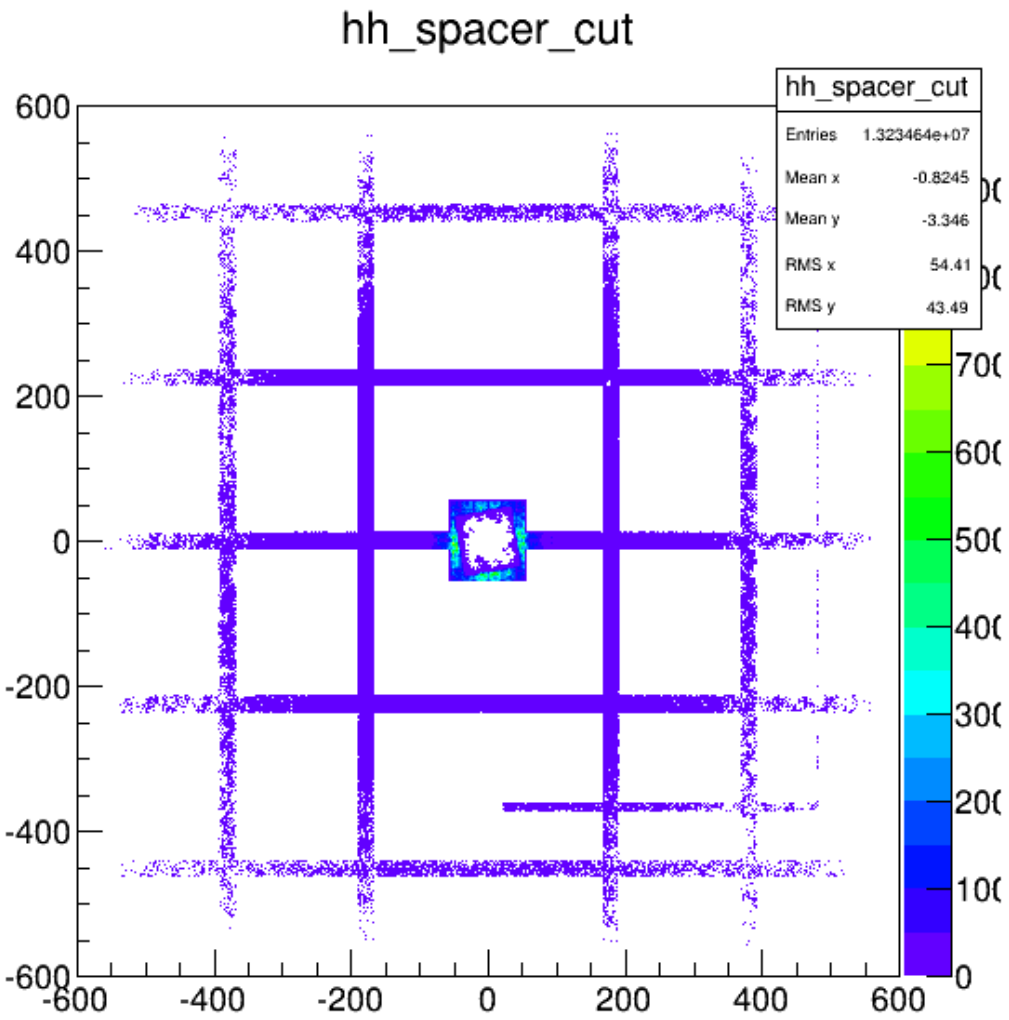
$$data\ loss = \frac{\#\ of\ cosmic\ events}{total\ events}$$



New cut

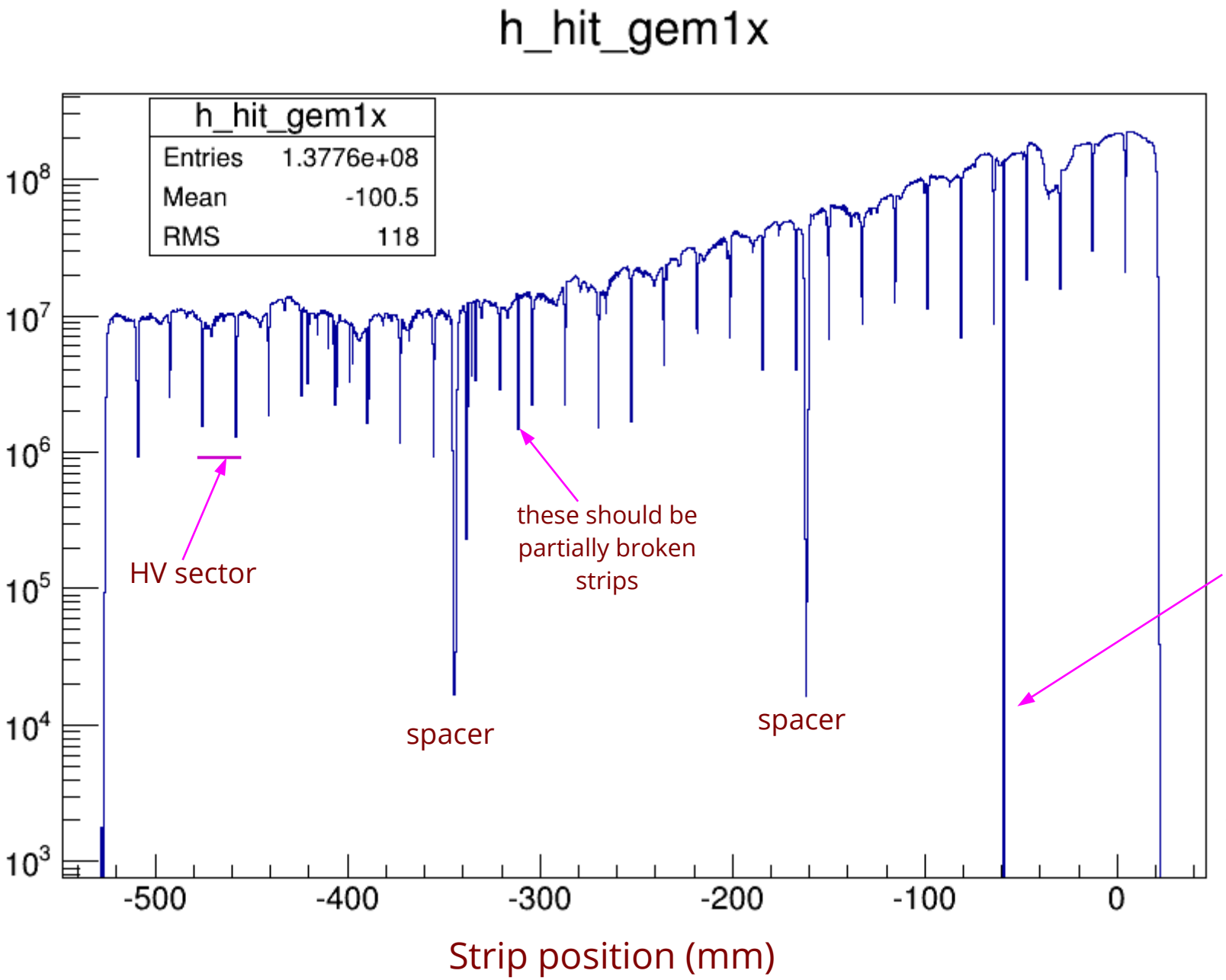


Old cut

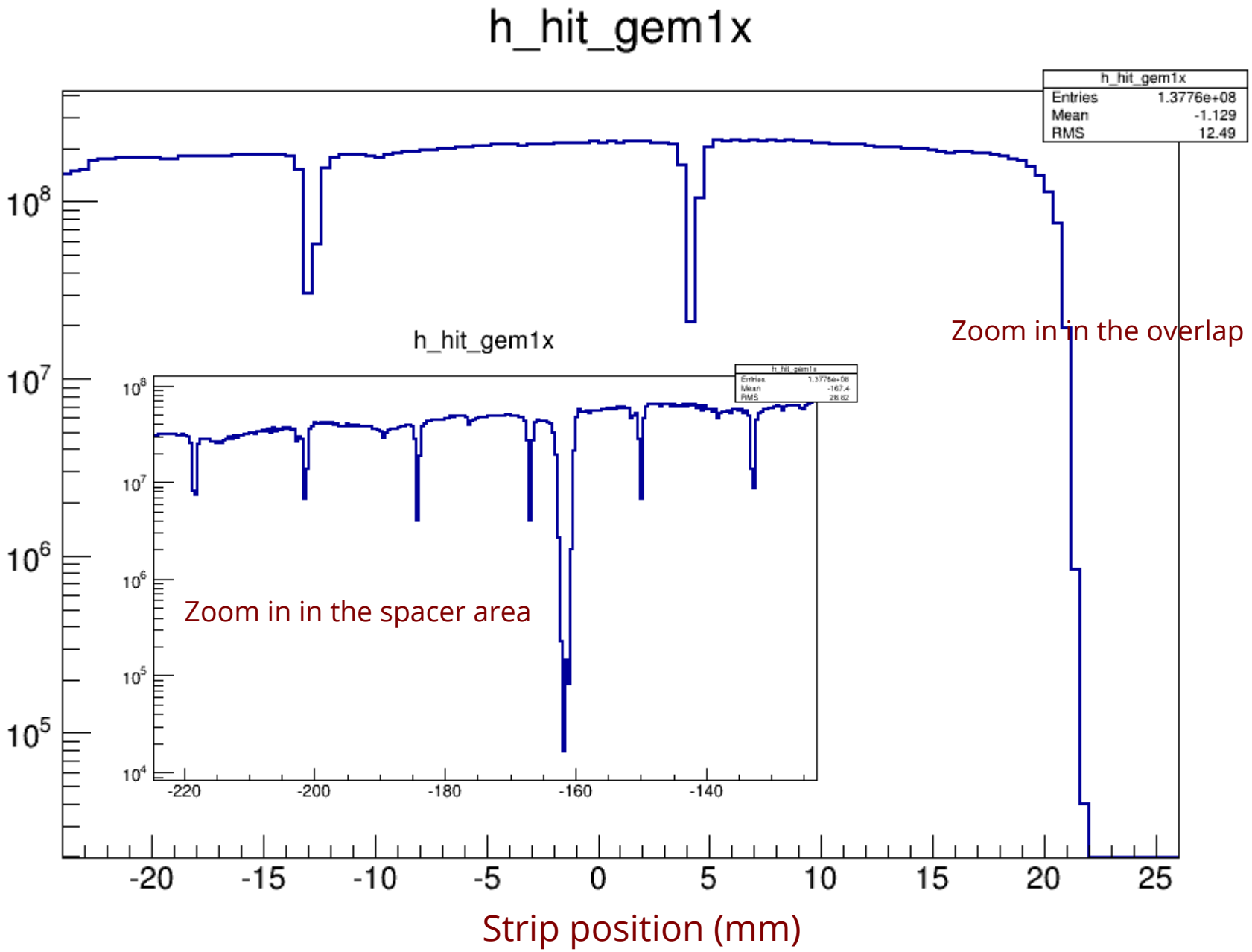


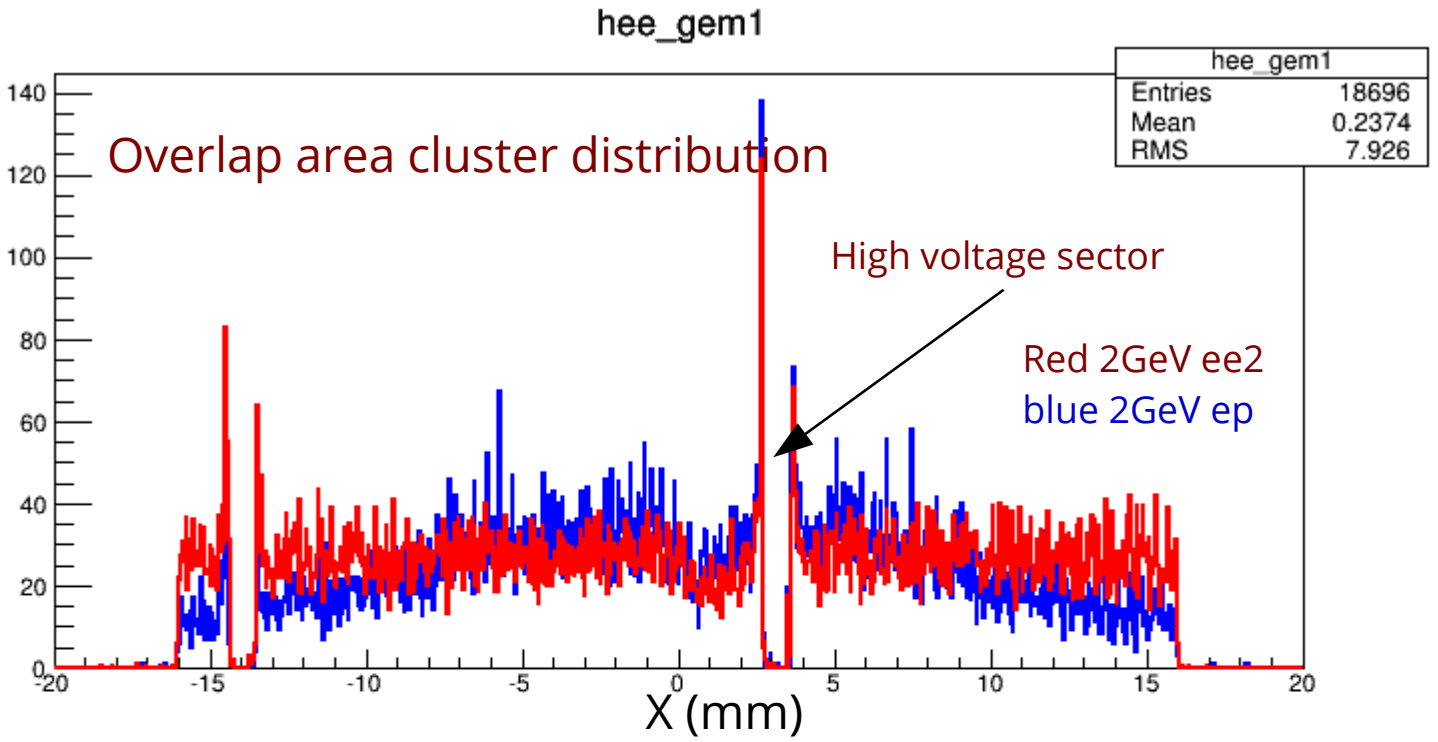
- Remove all events for which any part of the search circle falls out side the active area of the GEM, within 5 mm of a spacer or within the area of a broken strip.
- Remove all noisy events from the calculation when the noisy chamber goes in the denominator.

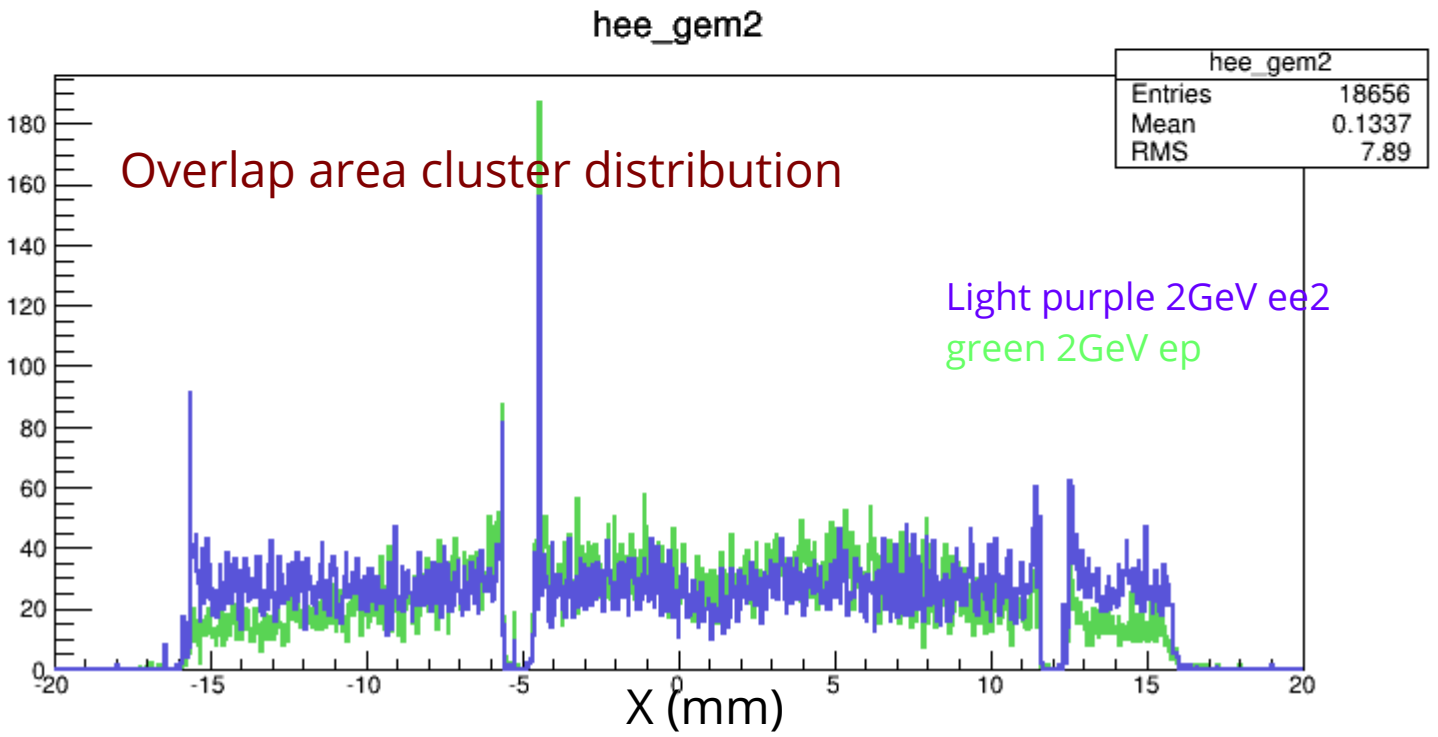
X plane hit distribution for GEM1 chamber



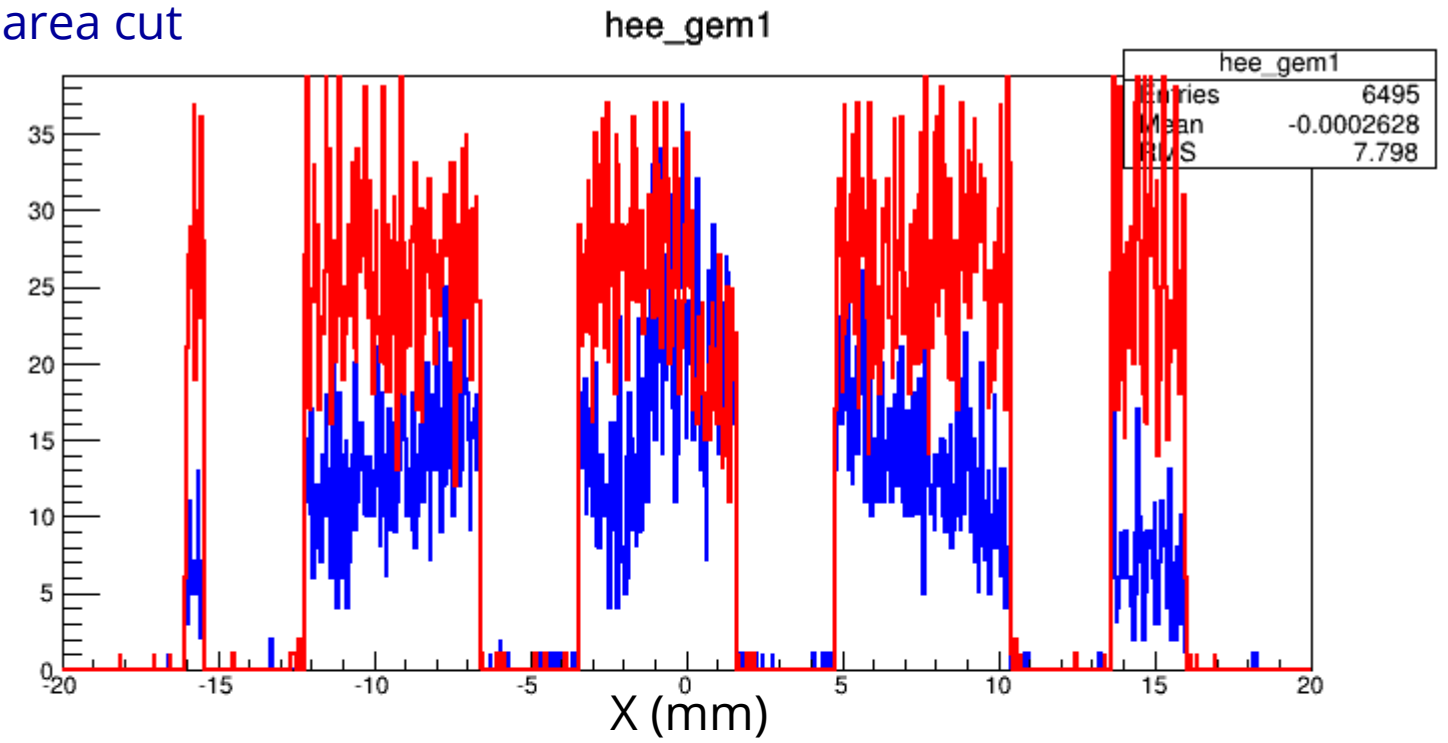
X plane hit distribution for GEM1 chamber

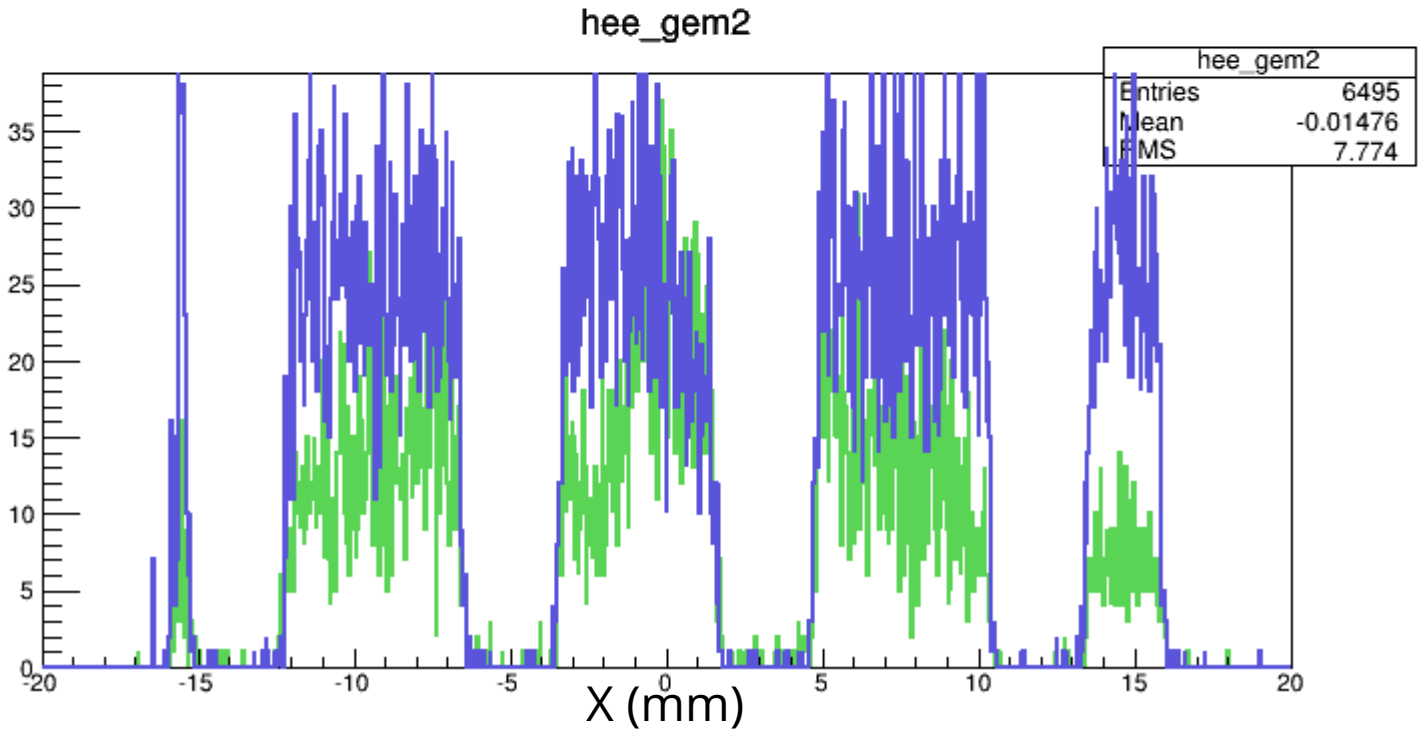



hee_gem1
hee_gem1
Entries 18696
Mean 0.2374
RMS 7.926
Overlap area cluster distribution
High voltage sector
Red 2GeV ee2
blue 2GeV ep
X (mm)

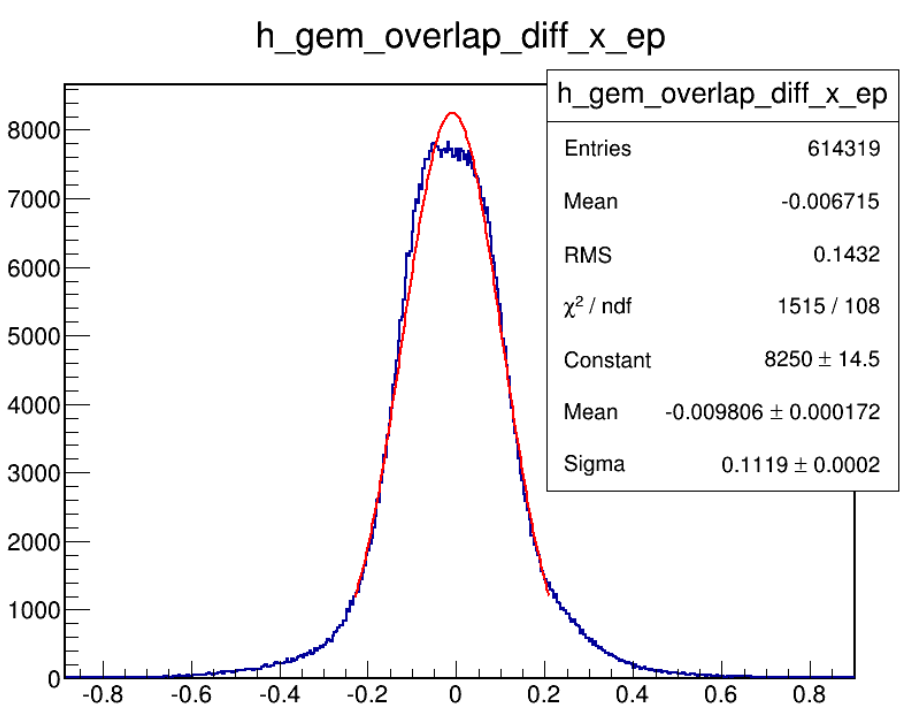

hee_gem2
hee_gem2
Entries 18656
Mean 0.1337
RMS 7.89
Overlap area cluster distribution
Light purple 2GeV ee2
green 2GeV ep
X (mm)

HV sector dead area cut

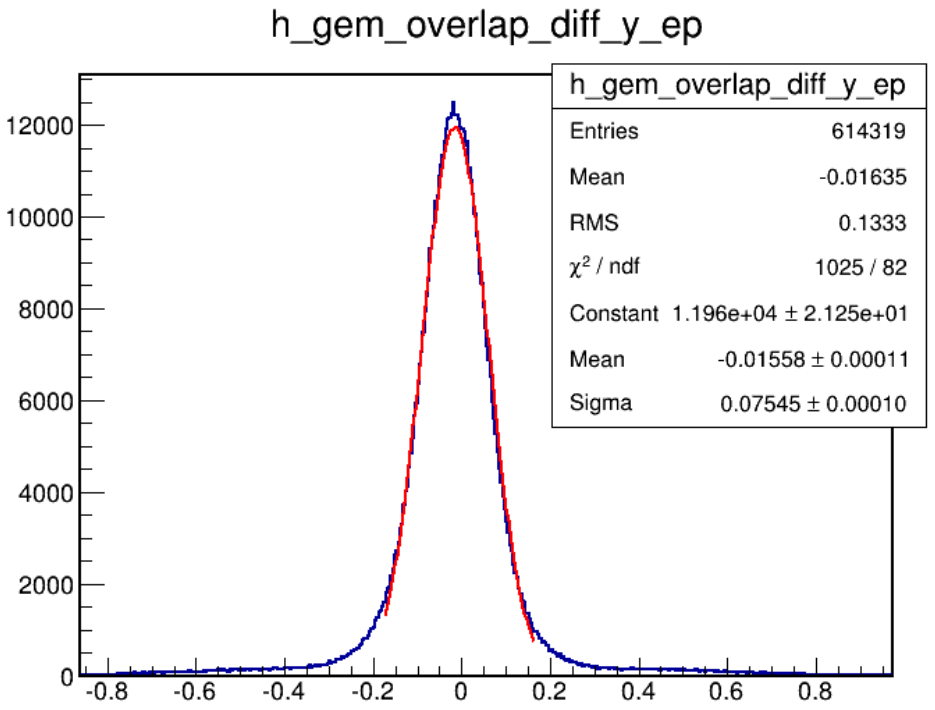




Overlap GEM coordinates check



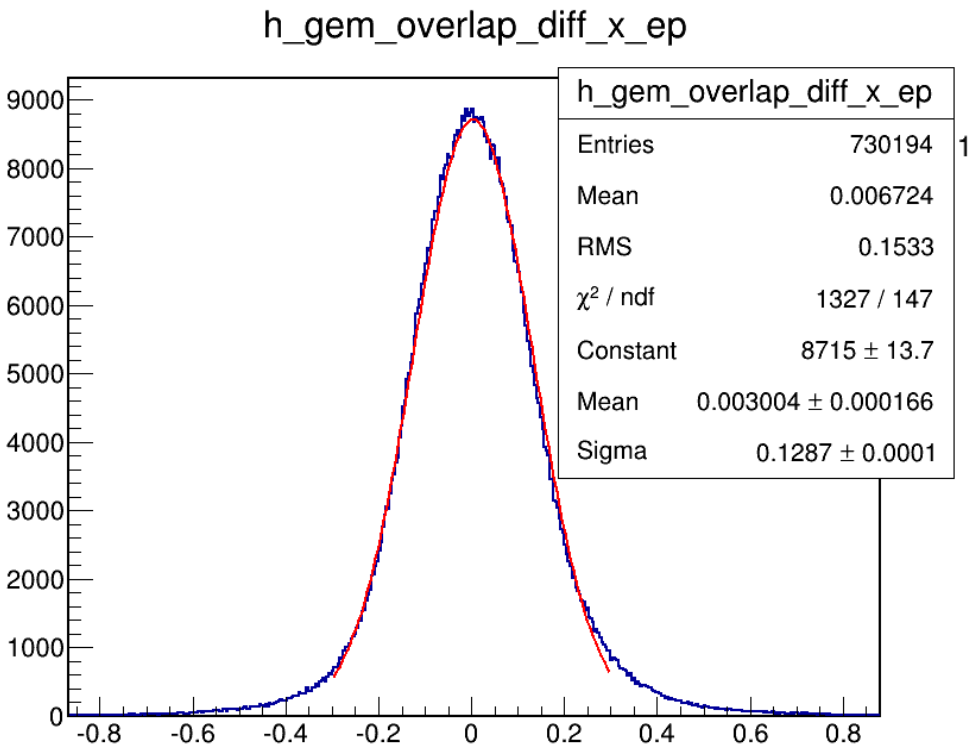
$x_{gem1} - x_{gem2}(mm)$



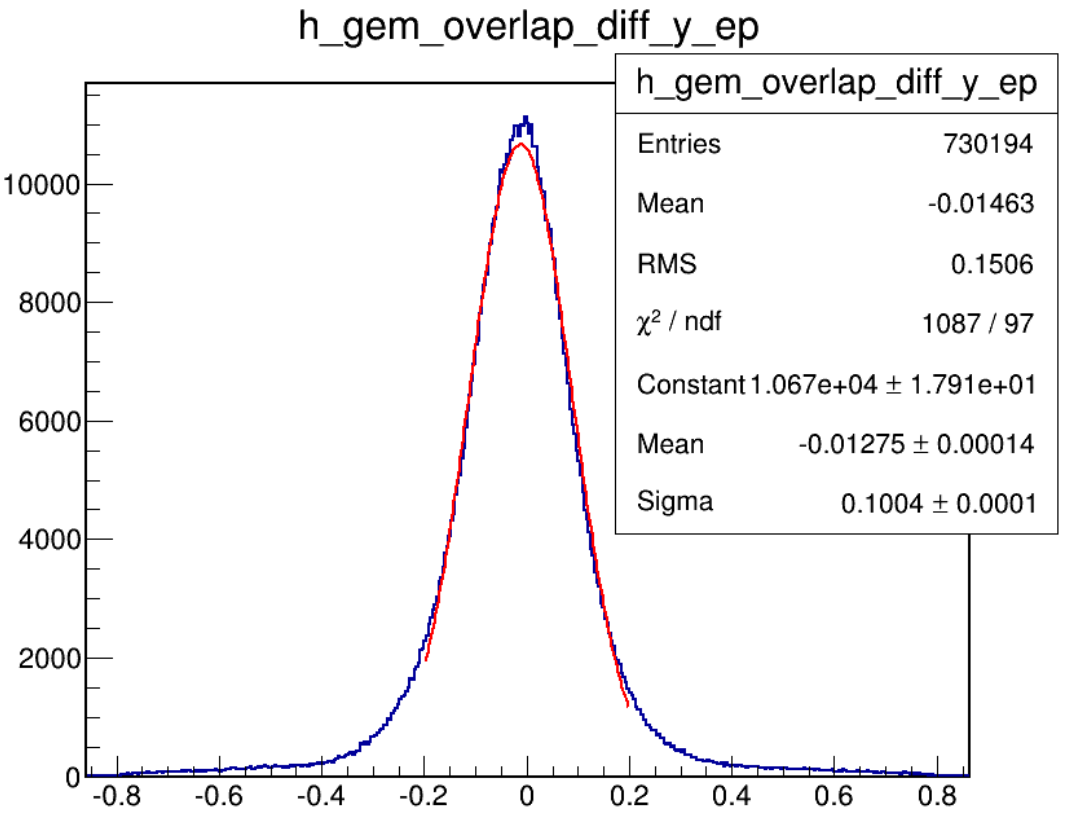
$y_{gem1} - y_{gem2}(mm)$

2GeV beam

Overlap GEM coordinates check



$x_{gem1} - x_{gem2}(mm)$

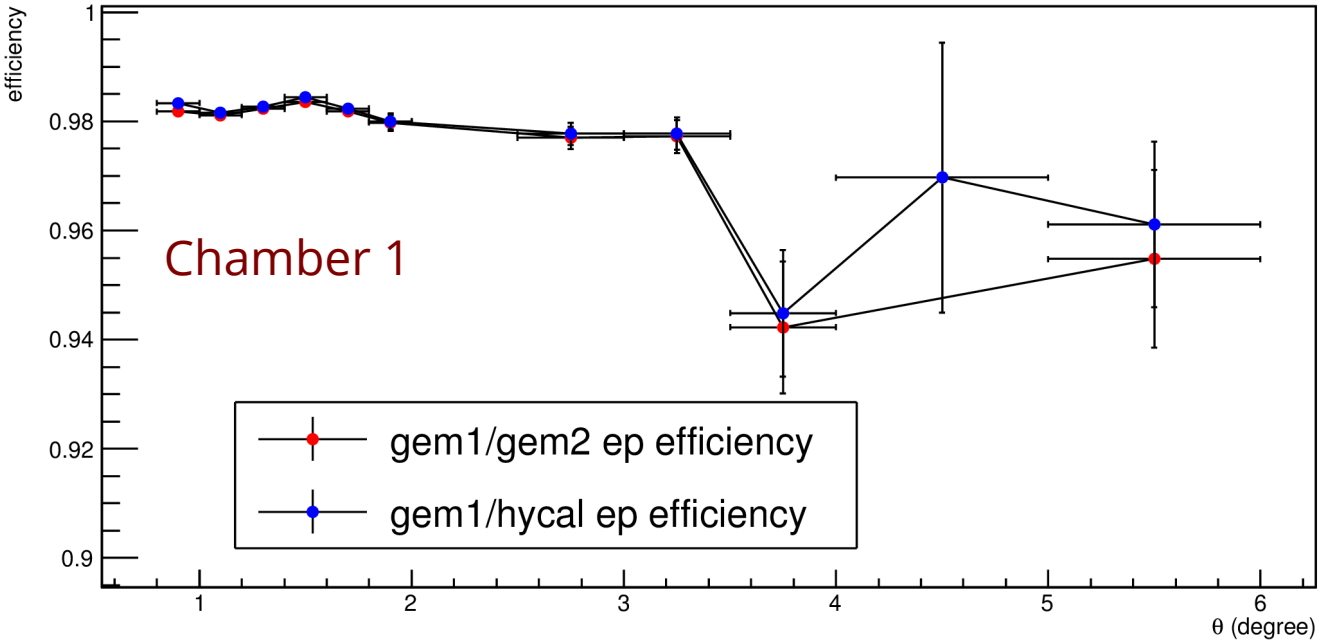


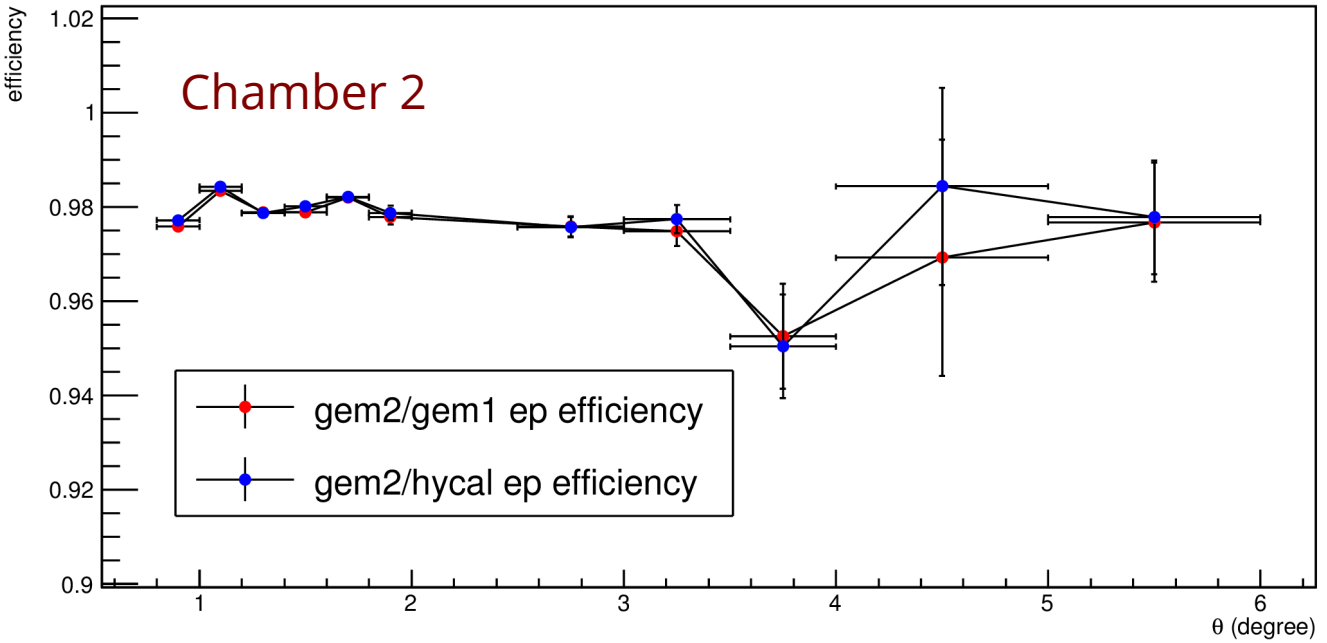
$y_{gem1} - y_{gem2}(mm)$

1GeV beam

Overlap area GEM ep efficiency 2GeV beam

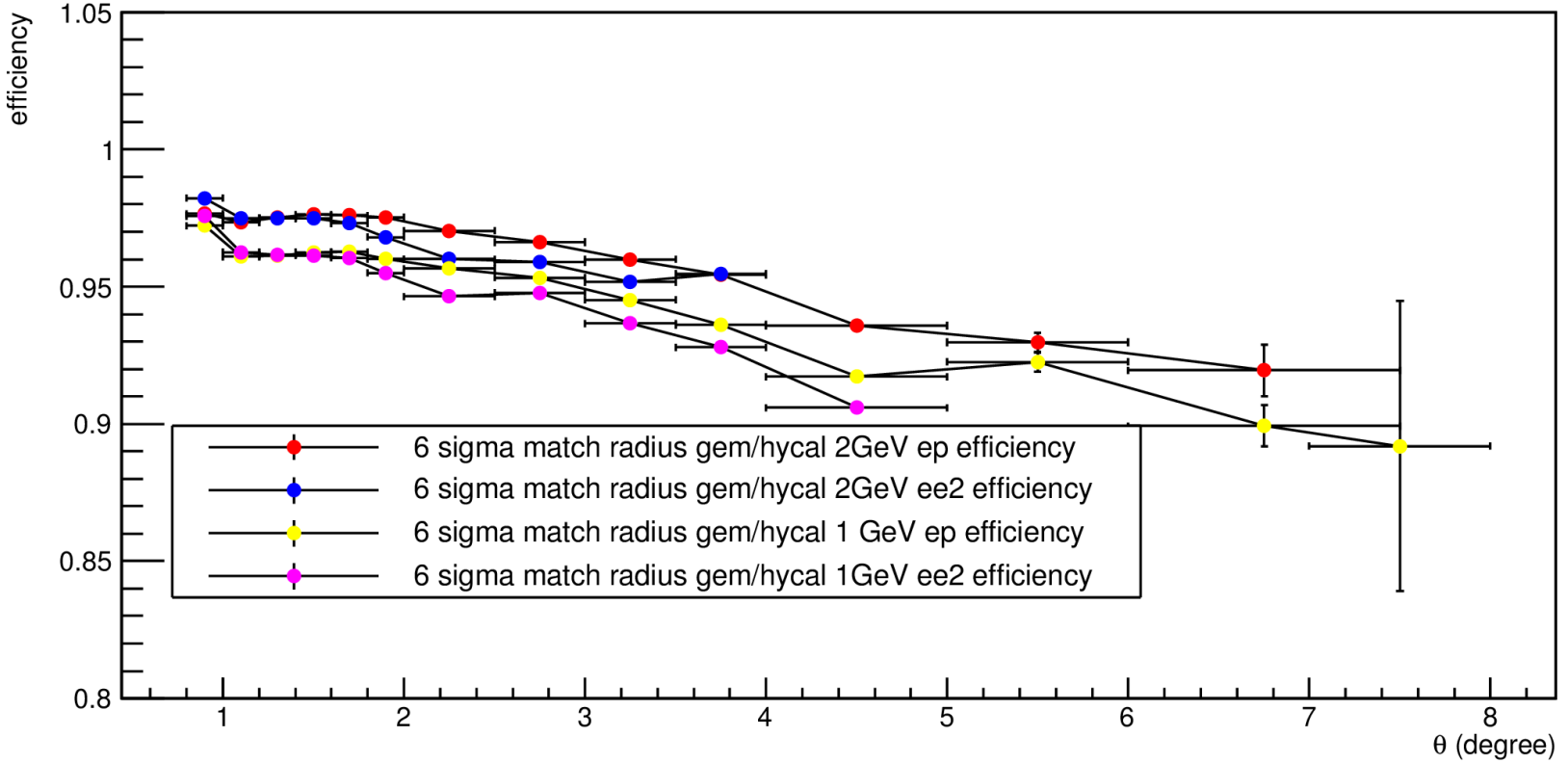
- GEM efficiency > 90%, for each HyCal cluster, chances for that both GEM chambers have no match <1%
- So require each HyCal cluster has at least 1 GEM match, for better theta reconstruction (gem/gem method).
- Discard events that both GEM chambers have no match





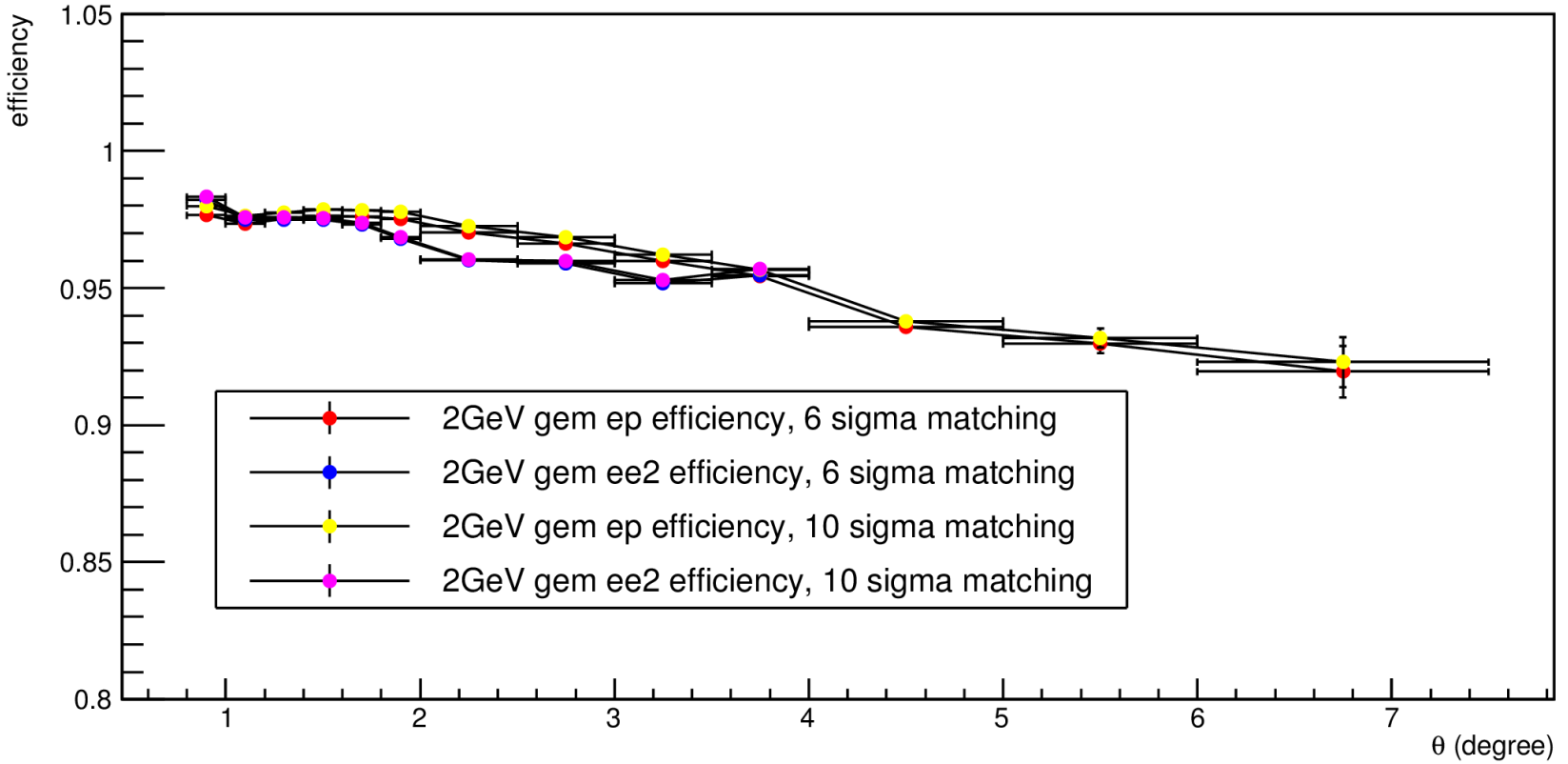
Overall area GEM ep efficiency

1GeV beam compare with 2 GeV beam



Overall area GEM ep efficiency

6 sigma matching radius compare with 10 sigma matching radius



Next steps for efficiency:

1) estimate accidentals on efficiency in overlapping area
2) different dead area (spacers, broken strips, HV sectors) cut size effect on efficiency
3)