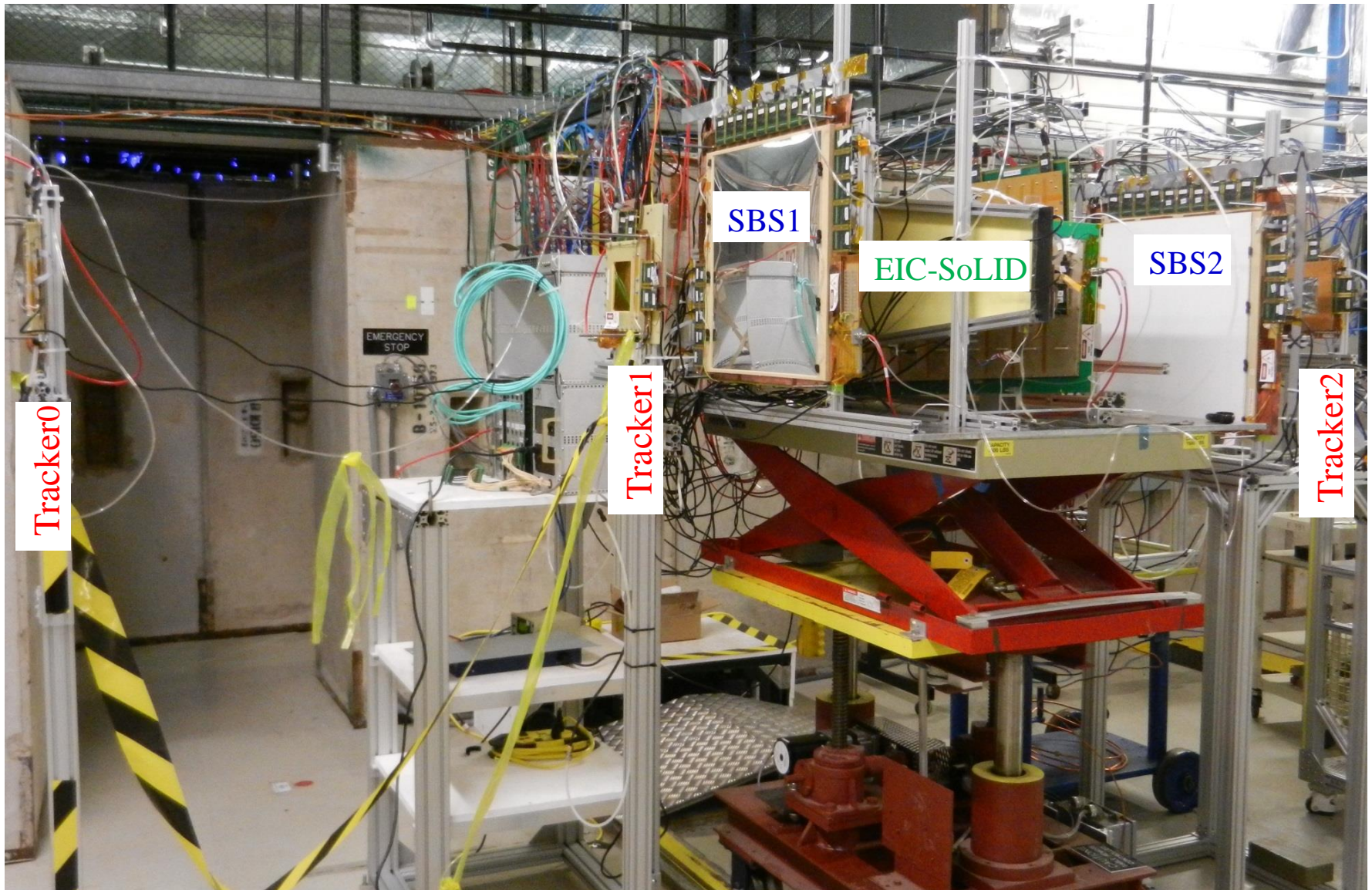


# FNAL-FTBF Beam Test Preliminary Results from UVa

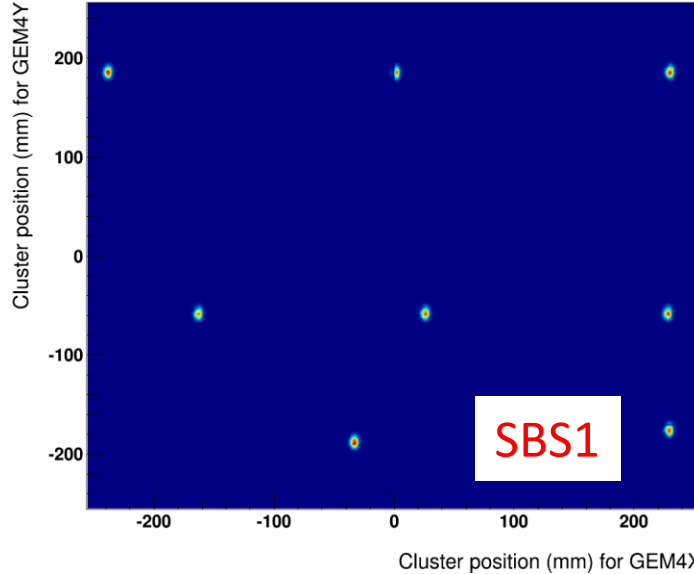
K. Gnanvo, N. Liyanage, V Nelyubin, C. Gu, Y. Zhao, X. Bai

# UVa & Florida tech FNAL Test Beam Setup

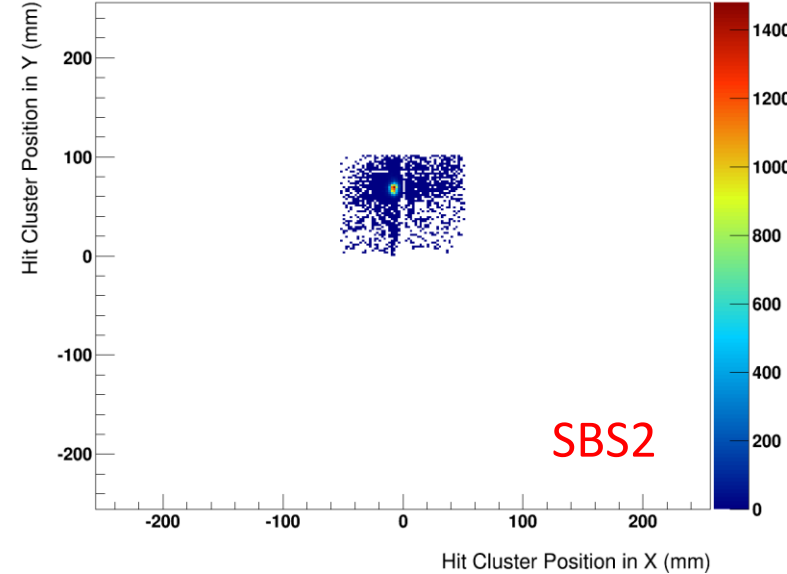


# 120 GeV Protons Beam: Position scan of SBS1

SBS1 Hit Position Map

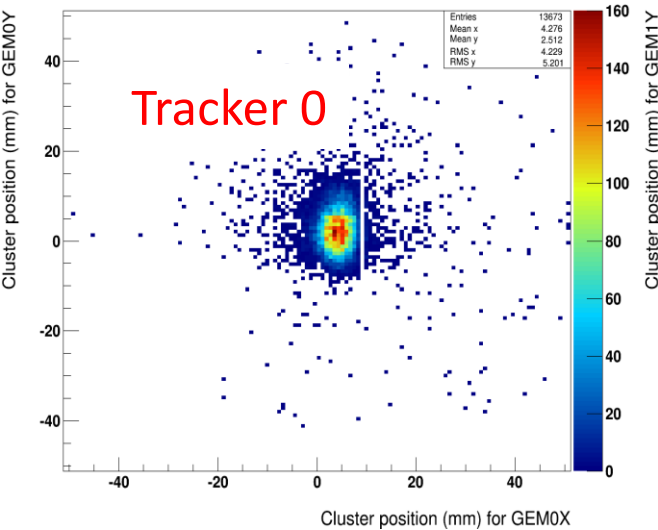


50 x 50 cm<sup>2</sup> SBS GEM2 Hit Position Map

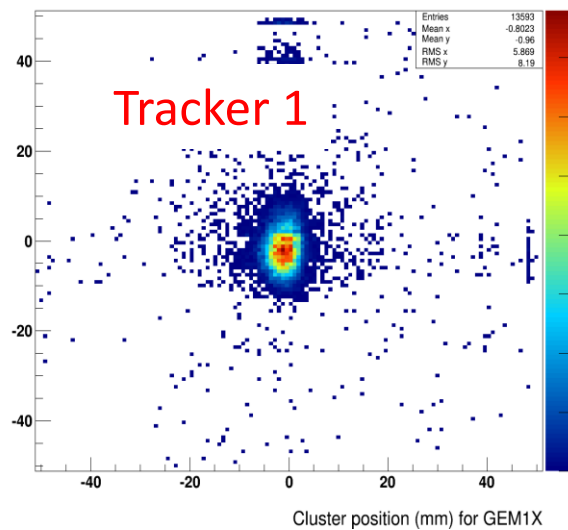


- 9 positions on SBS1
- 20 kEvs / position
- 3 APV25 time samples
- DAQ rate ~ 400 Hz

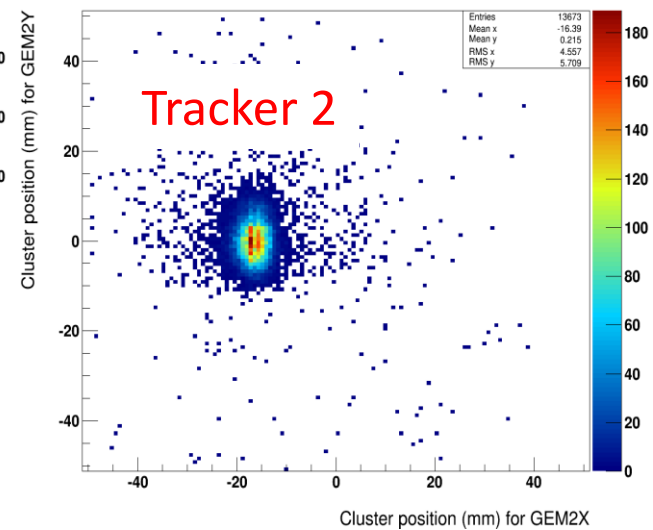
Trk0 Hit Position Map



Trk1 Hit Position Map



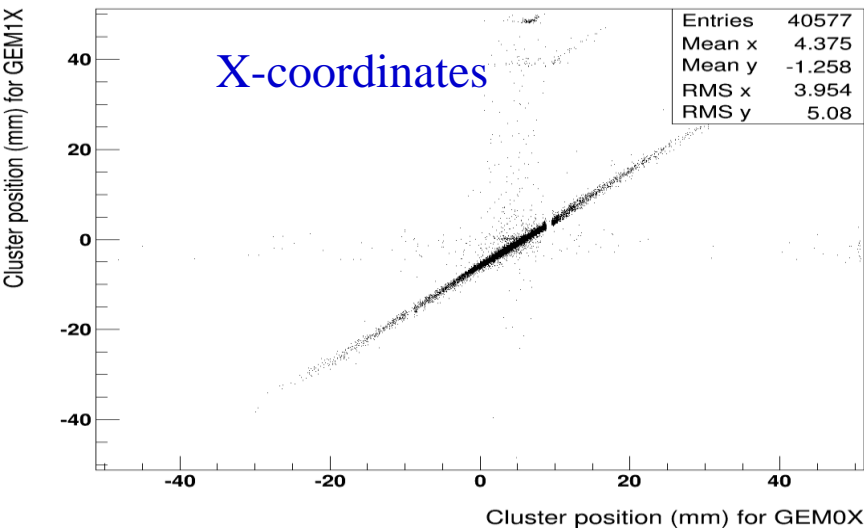
Trk2 Hit Position Map



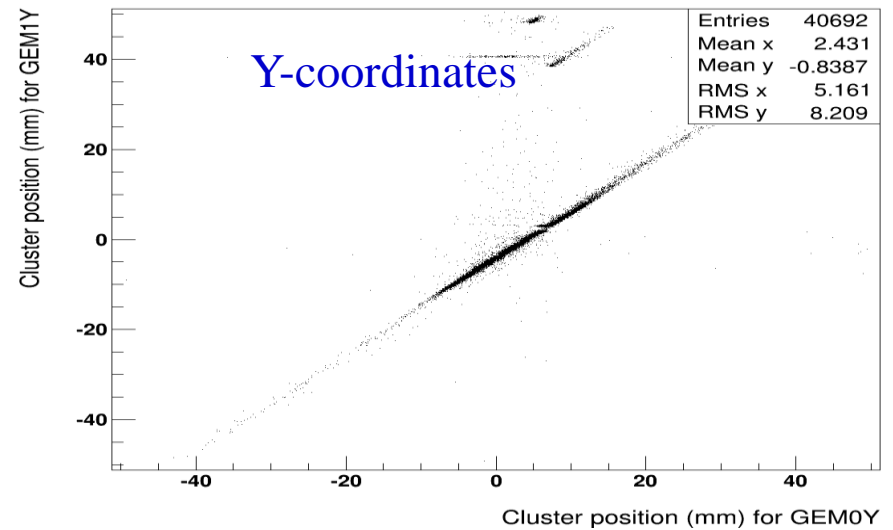
# 120 GeV Protons Beam: Position correlation of the small trackers

## Tracker0 vs. Tracker1

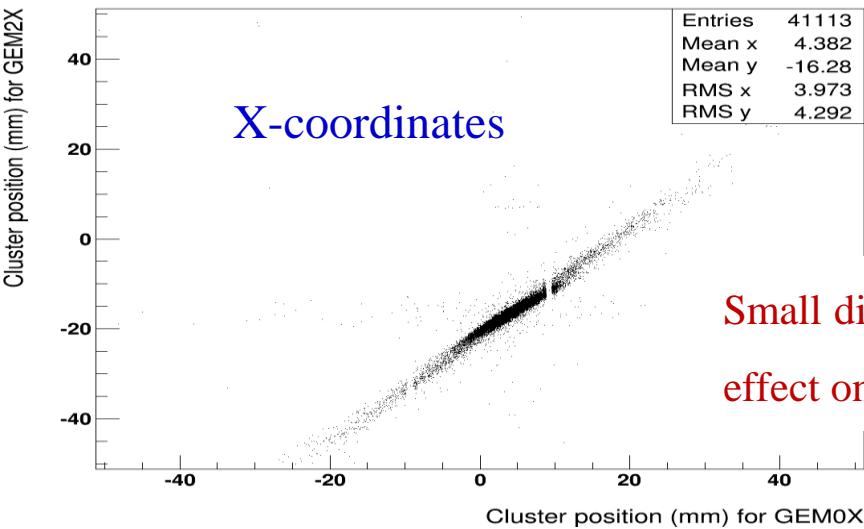
X-Correlation Trk0 vs. Trk1



Y-Correlation Trk0 vs. Trk1

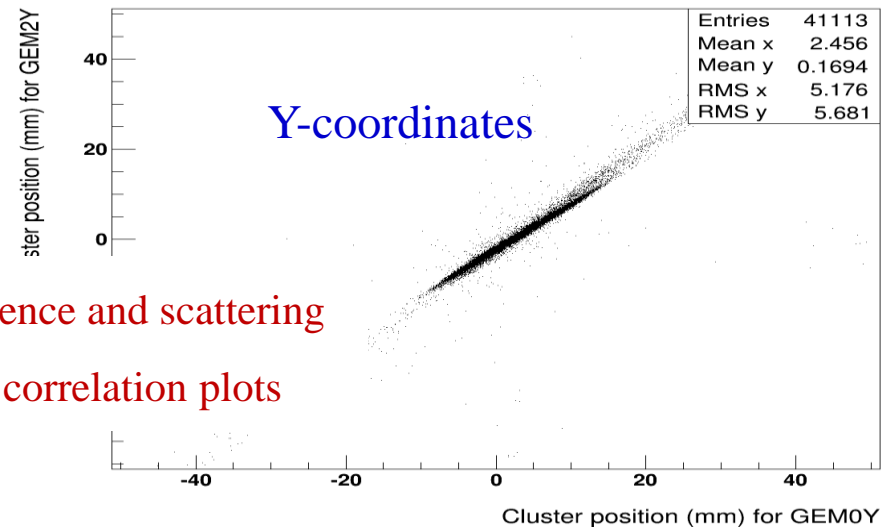


X-Correlation Trk0 vs. Trk2



## Tracker0 vs. Tracker2

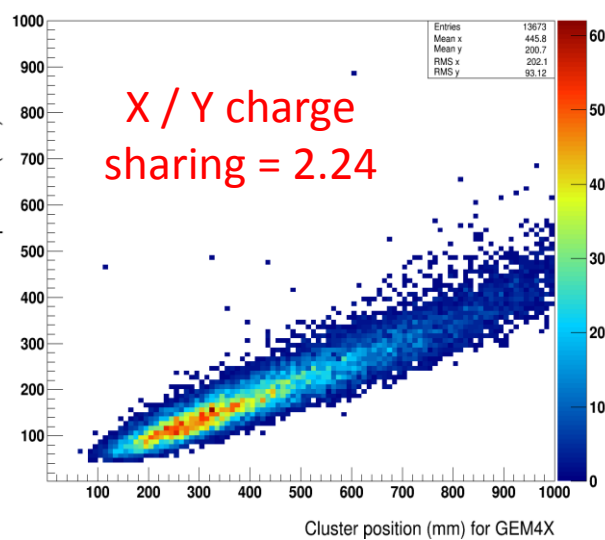
Y-Correlation Trk0 vs. Trk2



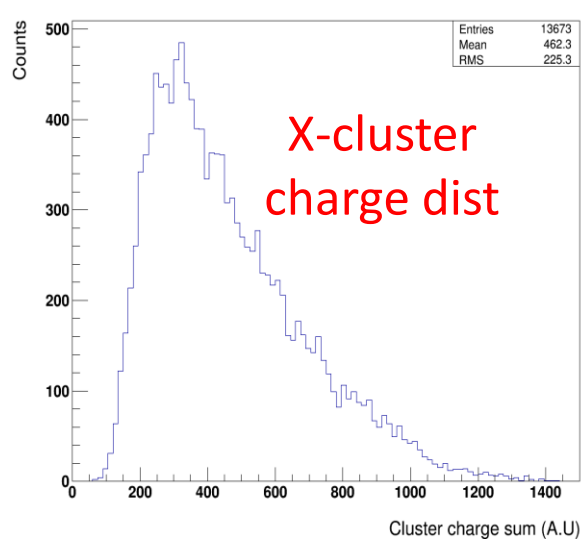
Small divergence and scattering  
effect on the correlation plots

# 120 GeV Protons Beam: SBS1 correlation of the trackers

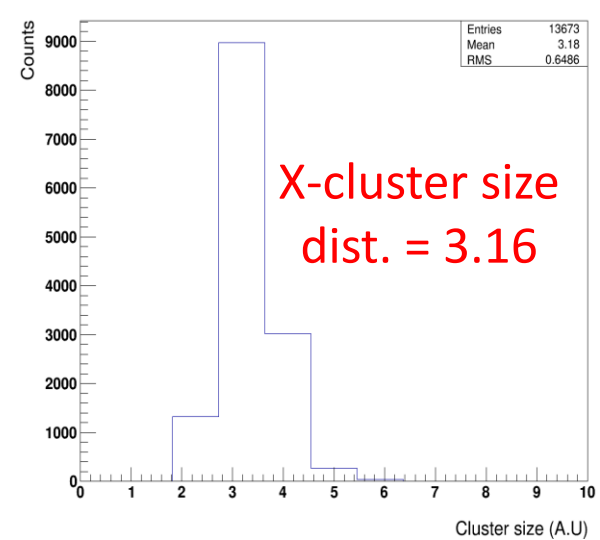
SBS1 cluster Charge Sharing



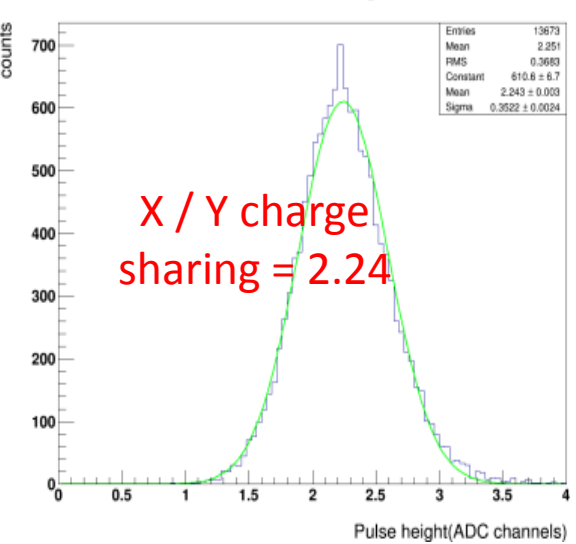
SBS1 cluster Charge Distr in X



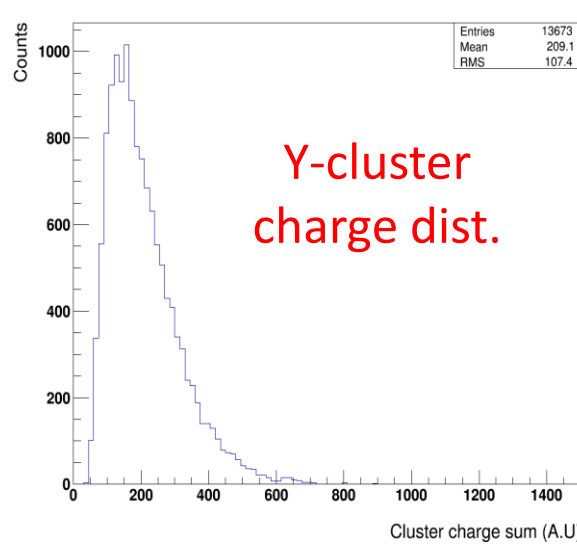
SBS1 cluster Size Distr in X



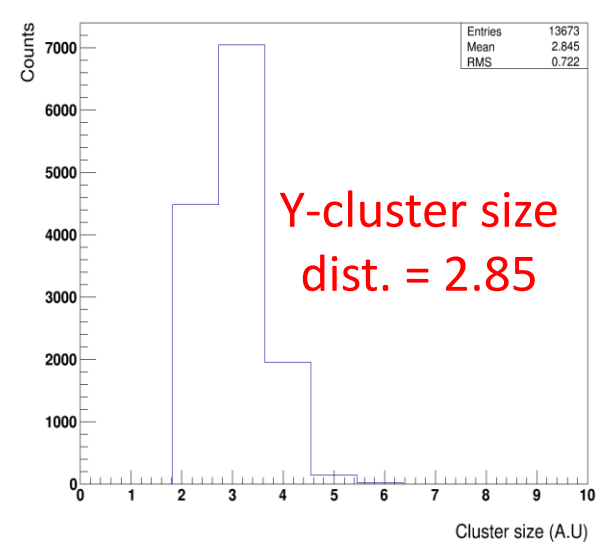
SBS1 cluster Charge Ratio



SBS1 cluster Charge Distr in Y



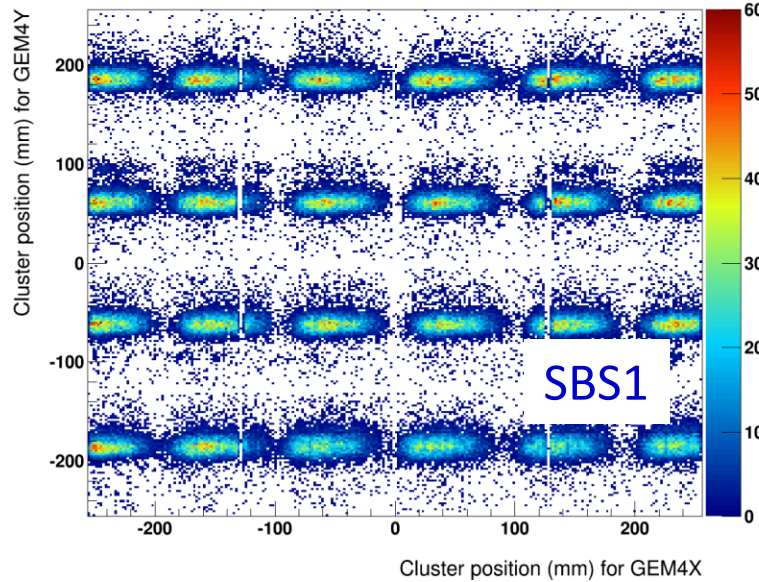
SBS1 cluster Size Distr in Y



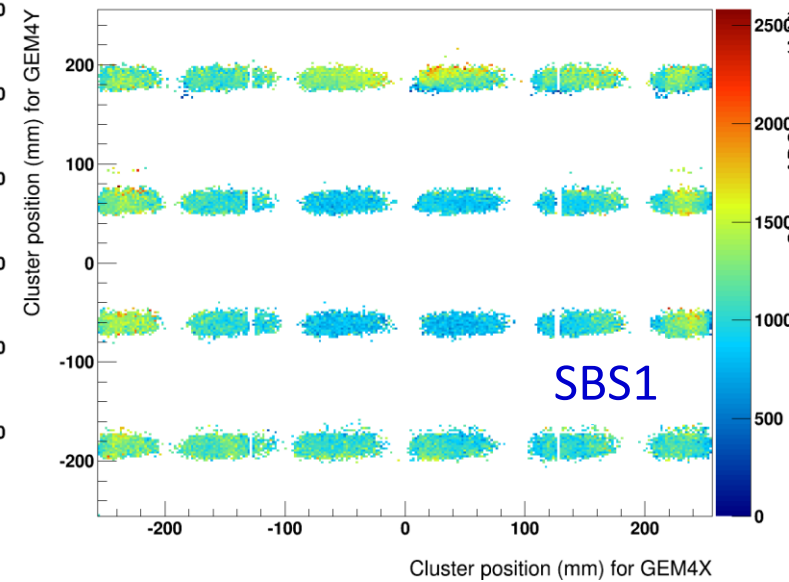


# 25 GeV Hadrons Beam: Position scan of SBS1

SBS1 Hit Position Map

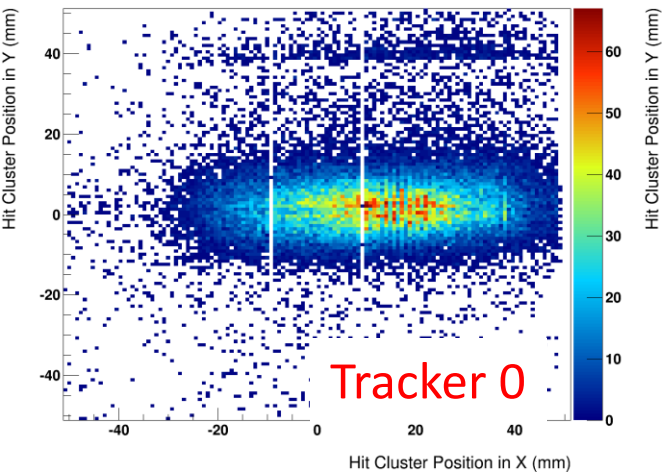


“mean” ADC counts =  $\frac{\sum_N \text{ADC}}{N_{\text{Hits}}}$

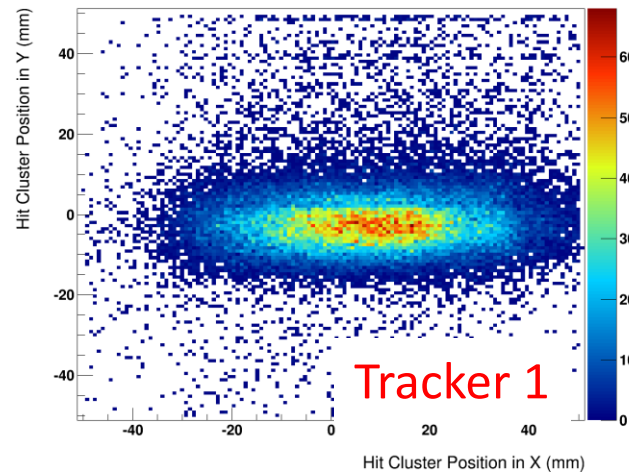


- 24 positions
- 10 kEVts / position
- 9 APV25 time samples
- DAQ rate ~ 100 Hz

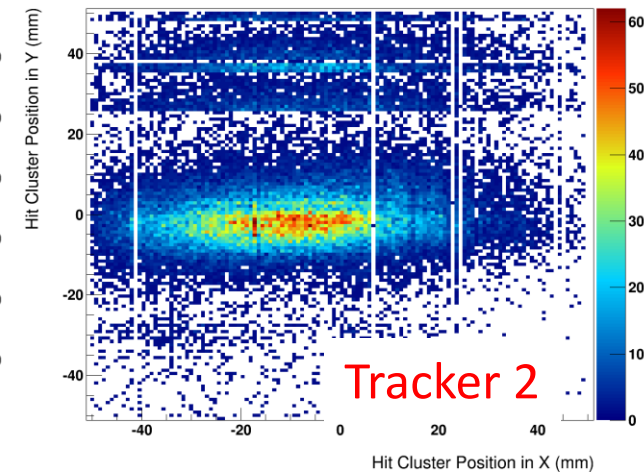
10 x 10 cm<sup>2</sup> Tracker GEM0 Hit Position Map



10 x 10 cm<sup>2</sup> Tracker GEM1 Hit Position Map



10 x 10 cm<sup>2</sup> Tracker GEM2 Hit Position Map



# 25 GeV Hadrons Beam: Position correlation of the small trackers

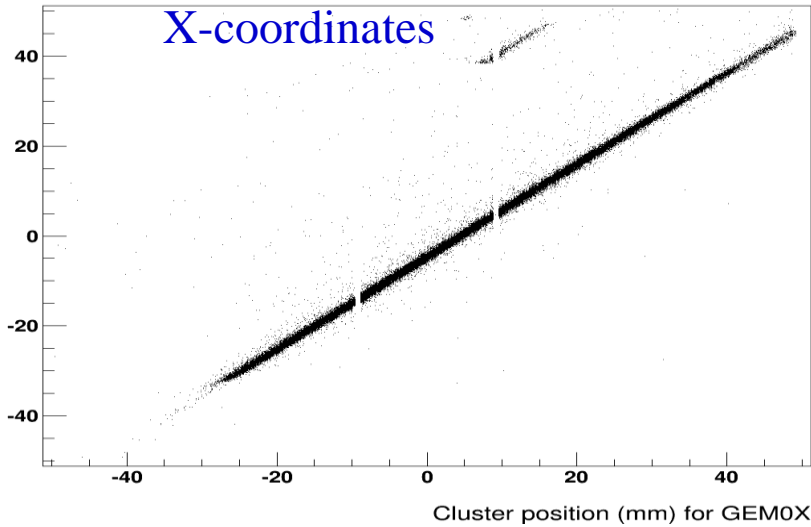
## Tracker0 vs. Tracker1

X-Correlation Trk0 vs. Trk1

Y-Correlation Trk0 vs. Trk1

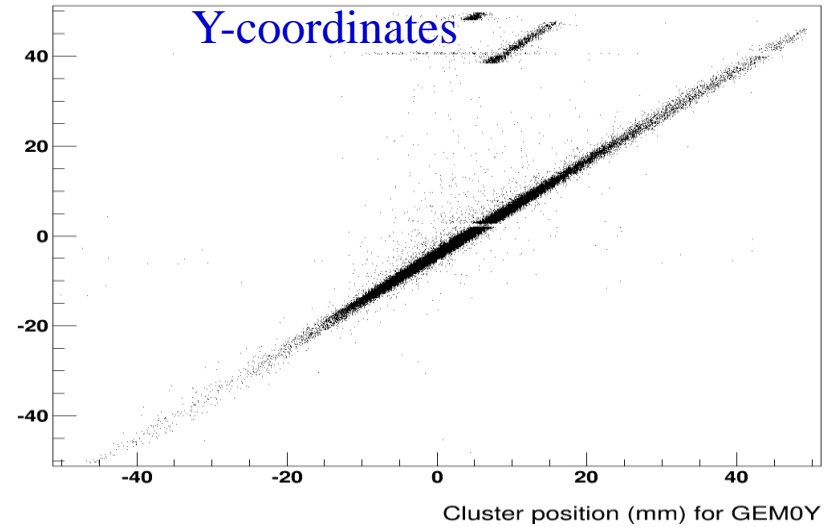
Cluster position (mm) for GEM1X

X-coordinates



Cluster position (mm) for GEM1Y

Y-coordinates



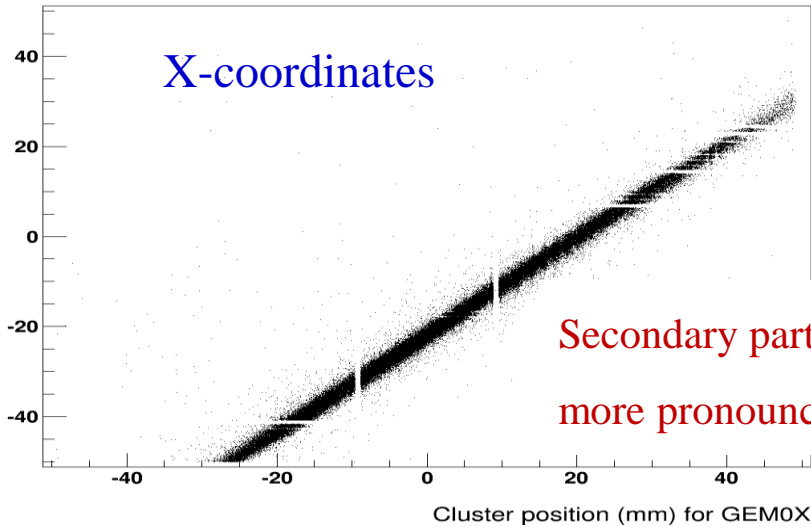
X-Correlation Trk0 vs. Trk2

## Tracker0 vs. Tracker2

Y-Correlation Trk0 vs. Trk2

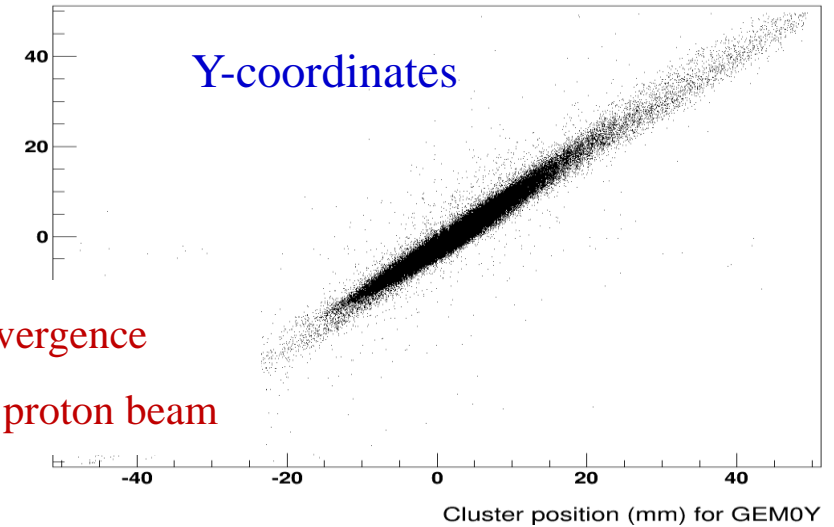
Cluster position (mm) for GEM2X

X-coordinates



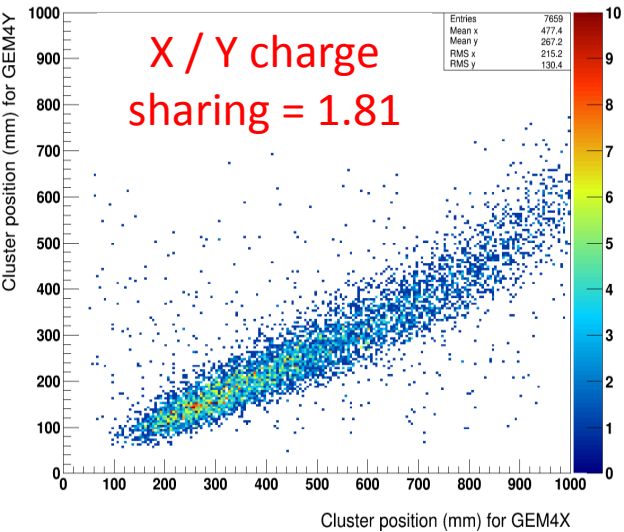
Cluster position (mm) for GEM2Y

Y-coordinates

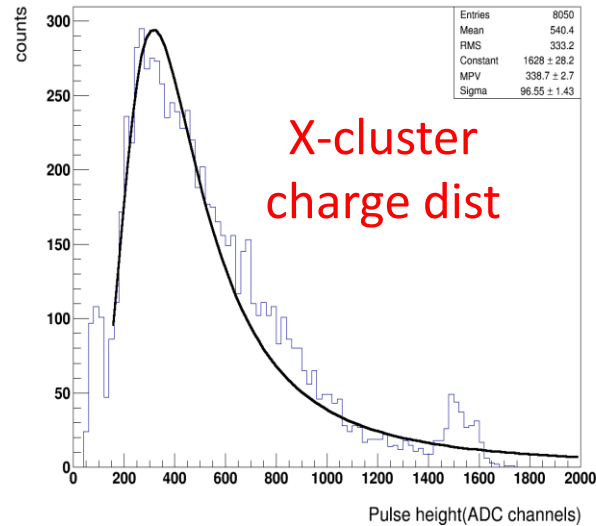


# 120 GeV Protons Beam: SBS1

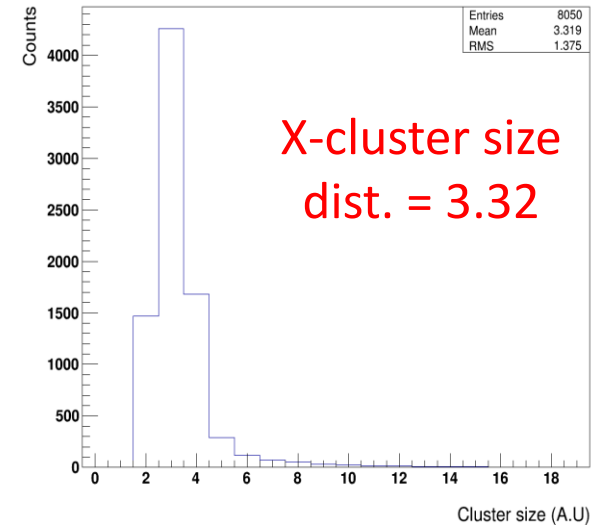
SBS1 cluster Charge Sharing



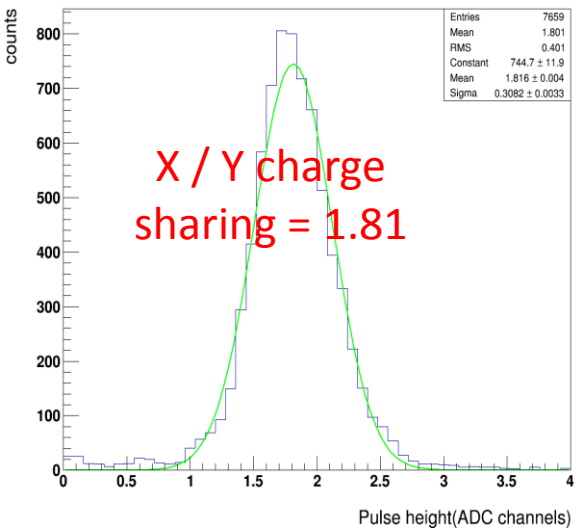
SBS1 cluster Charge Distr in X



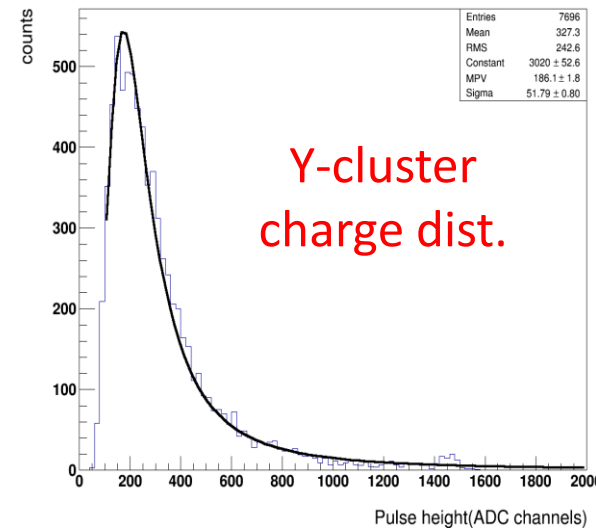
SBS1 cluster Size Distr in X



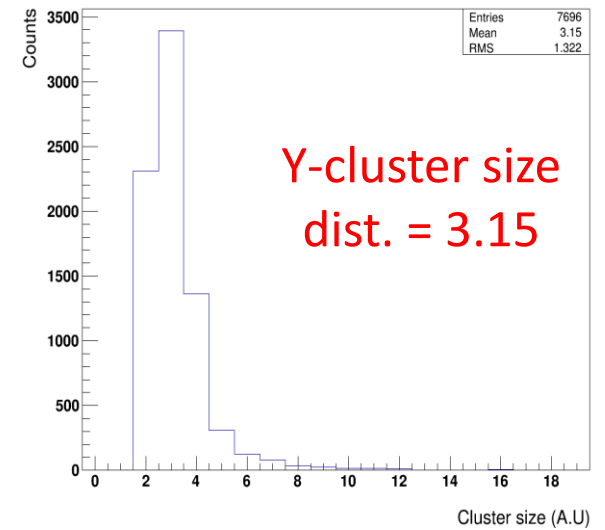
SBS1 cluster Charge Ratio



SBS1 cluster Charge Distr in Y



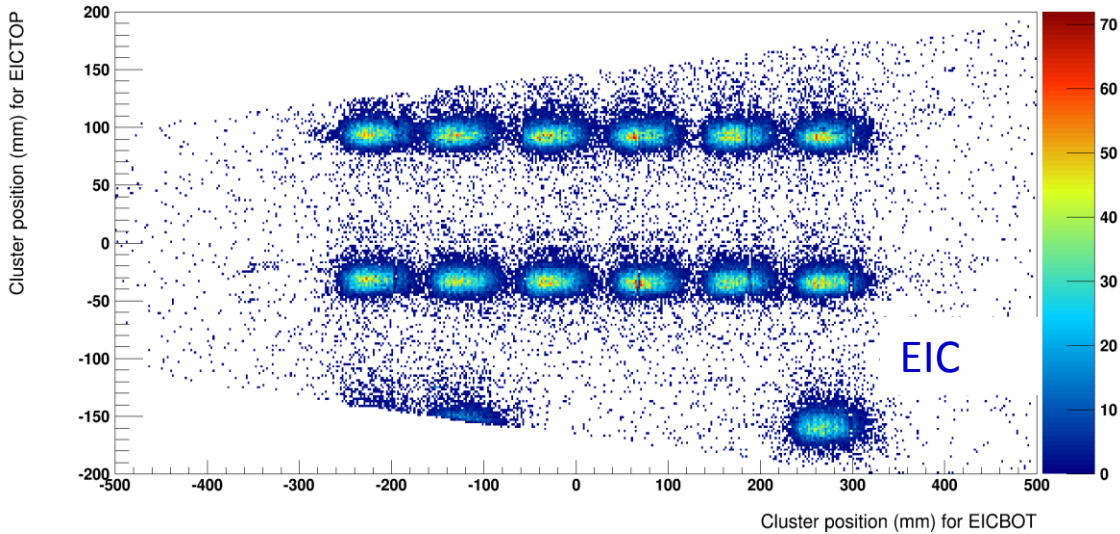
SBS1 cluster Size Distr in Y



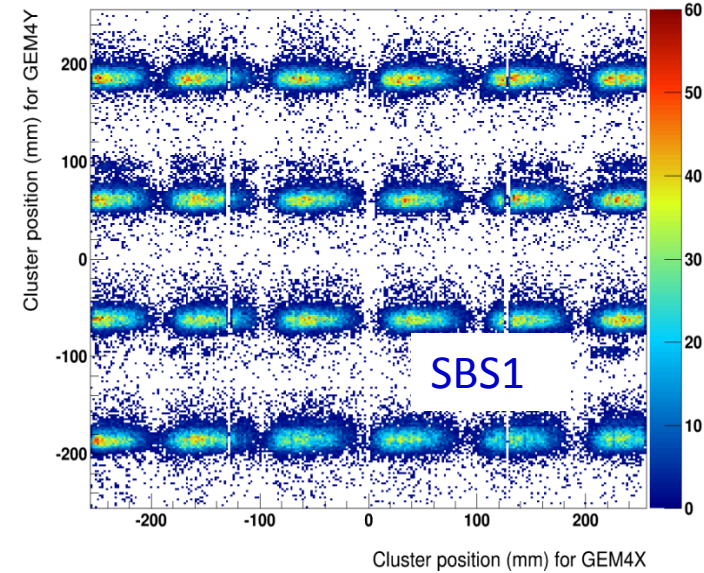


# EIC-SoLID and SBS1: 25 GeV Hadron beams Position Scan

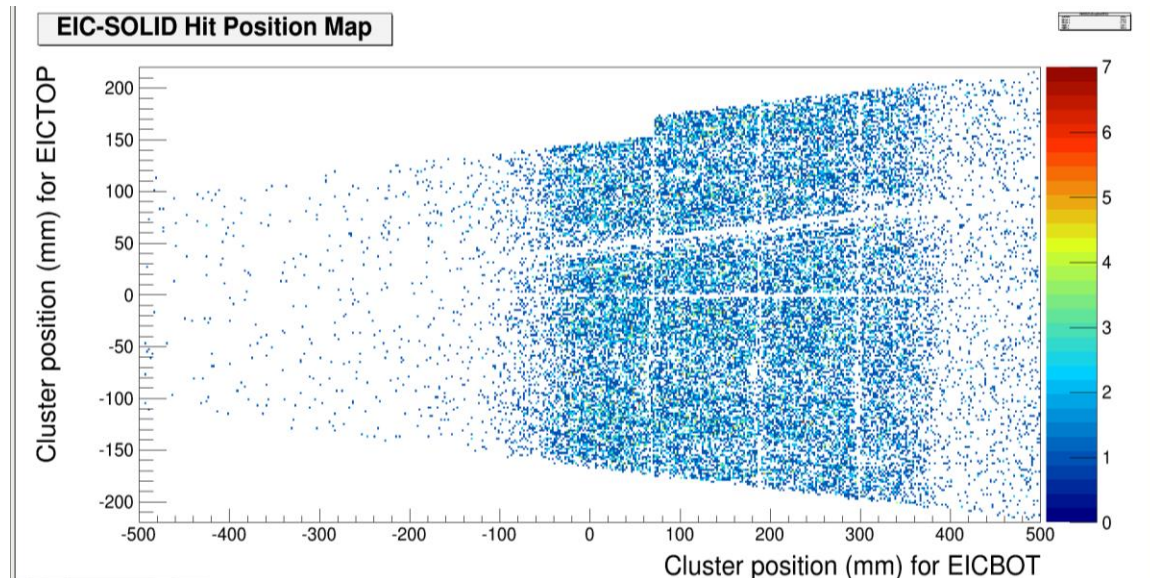
EIC-SOLID Hit Position Map



SBS1 Hit Position Map

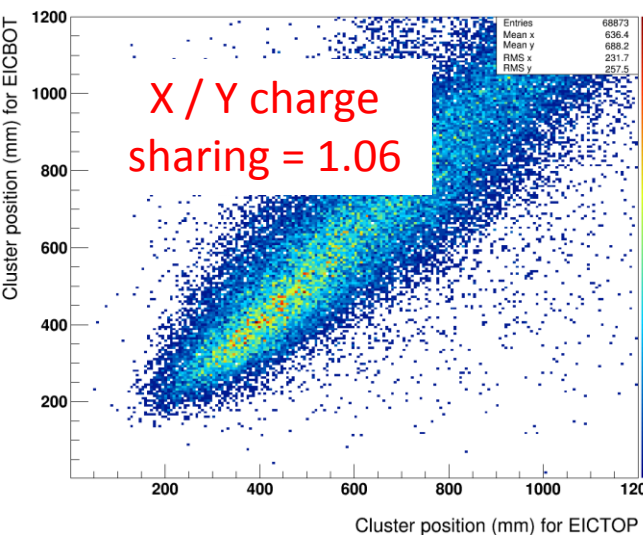


## EIC-SoLID: Cosmic data

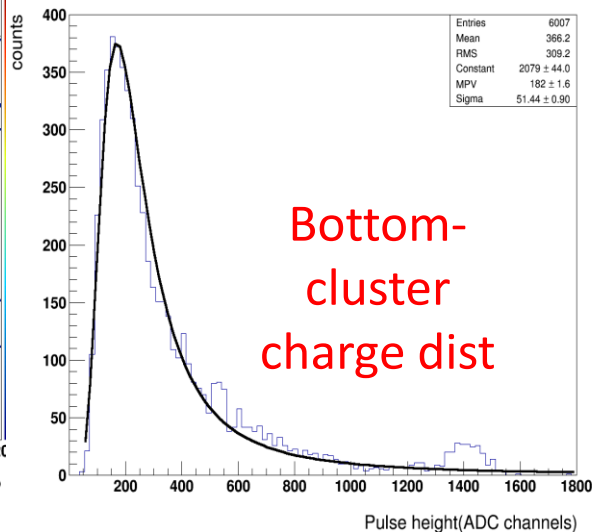


# Cosmic data (*UVa, Dec. 2013*): EIC-SoLID

EIC-SoLID cluster Charge Sharing



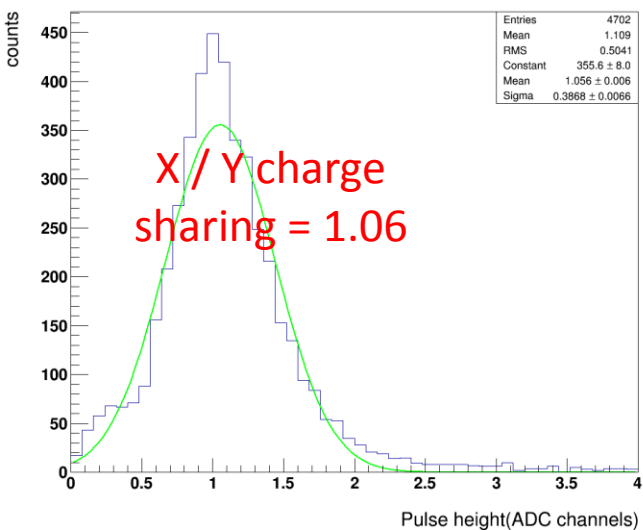
EIC-SoLID cluster Charge Distr BOT



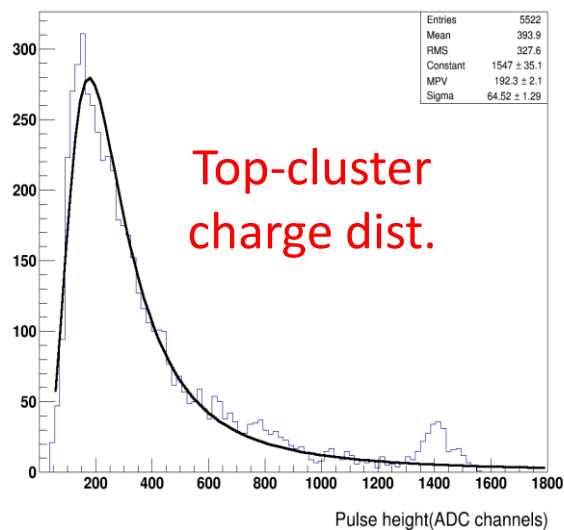
EIC-SoLID cluster Size Distr BOT



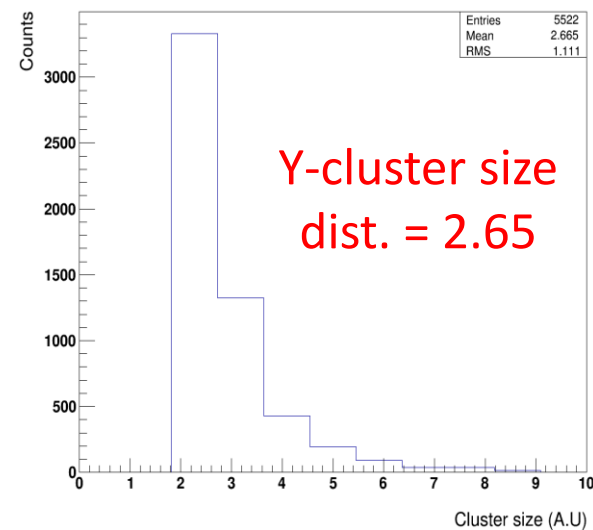
EIC-SoLID cluster Charge Ratio



EIC-SoLID cluster Charge Distr TOP

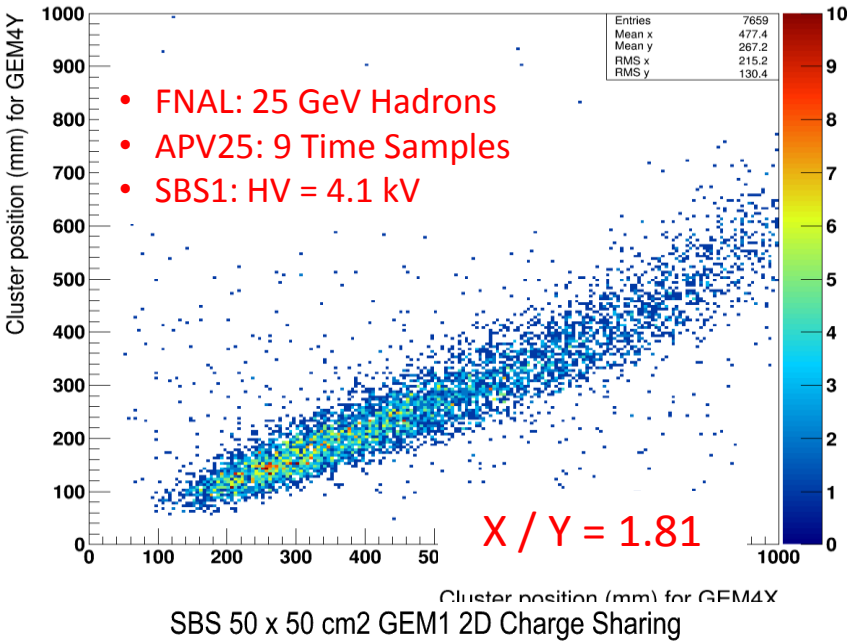


EIC-SoLID cluster Size Distr TOP

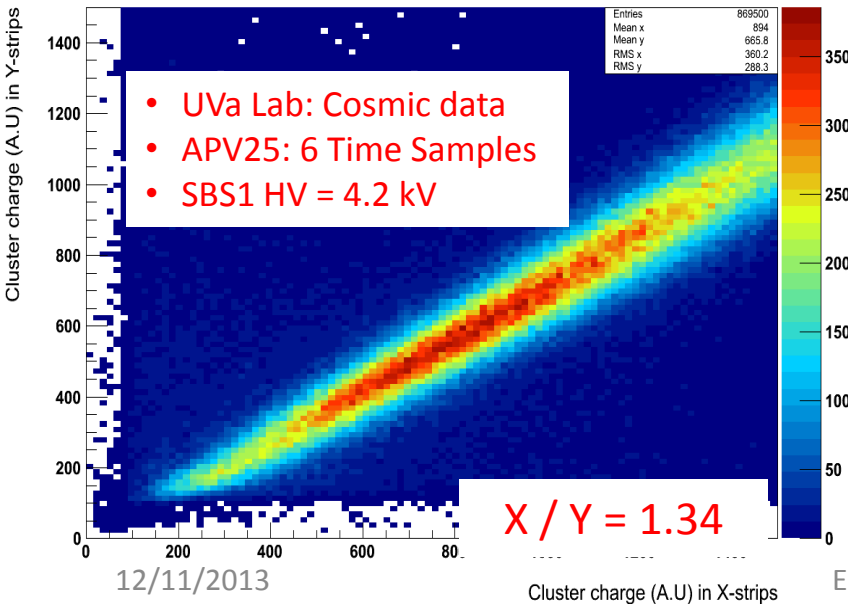
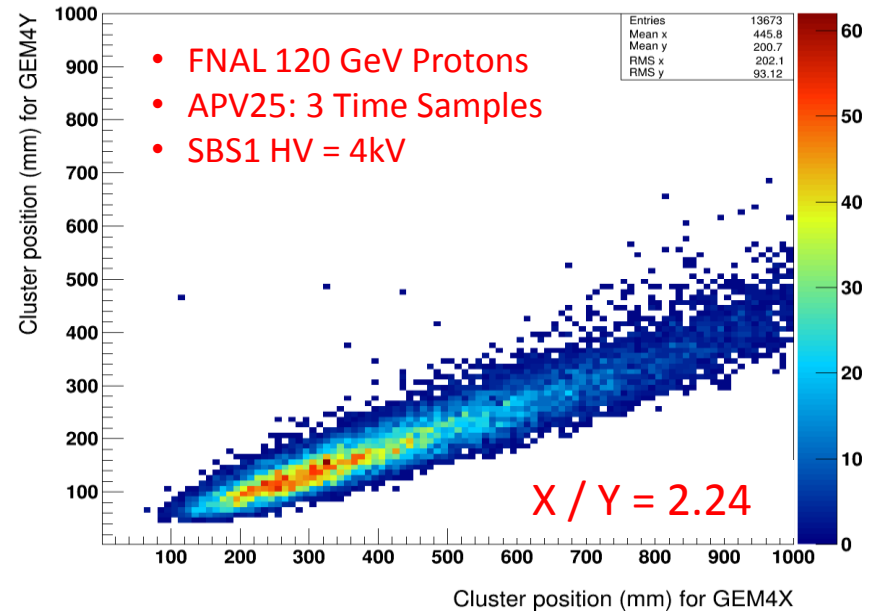


# Charge sharing conundrum with SBS1

SBS1 cluster Charge Sharing



SBS1 cluster Charge Sharing



Big variation of the charge sharing for different data taking

## Possible candidates:

- Gas flow
- Gas pressure
- Particle rate
- Electronics ?

*Under investigation*

# Summary and To do List

- Ongoing analysis of the data form the beam test at FNAL
  - Preliminary data are very good for all chambers
  - Some issues with charge sharing with the SBS1 chamber to be understood
  - EIC-SoLID chamber working very well → mapping puzzle needed to be sorted out
  - Nice position correlation plots from the trackers → small divergence of the beam from multiple scattering
- To do
  - Study of the spatial resolution of SBS and EIC-SoLID chambers
  - Need to understand the charge sharing variation
  - Get results ready for publication