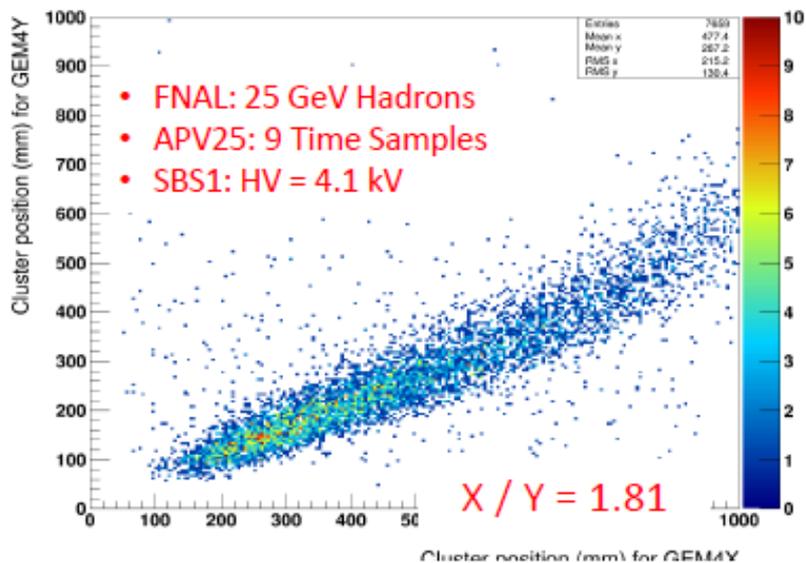


Explaining the variation of X/Y charge sharing of the SBS GEMs readout boards

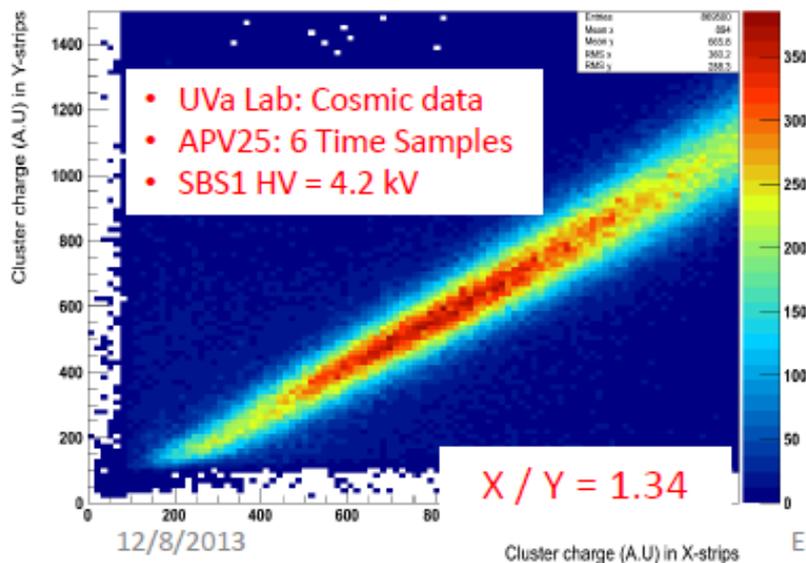
Kondo Gnanvo

Charge sharing conundrum with SBS1

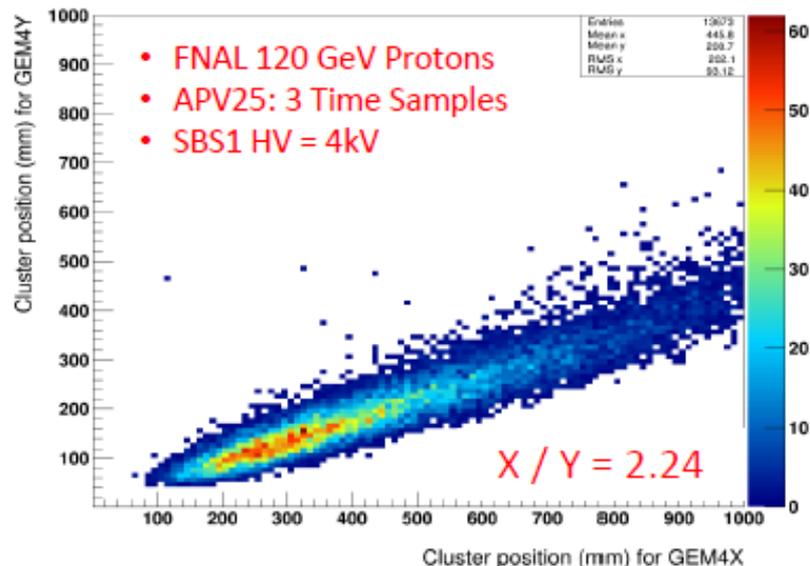
SBS1 cluster Charge Sharing



SBS 50 x 50 cm2 GEM1 2D Charge Sharing



SBS1 cluster Charge Sharing



Big variation of the charge sharing for different data taking

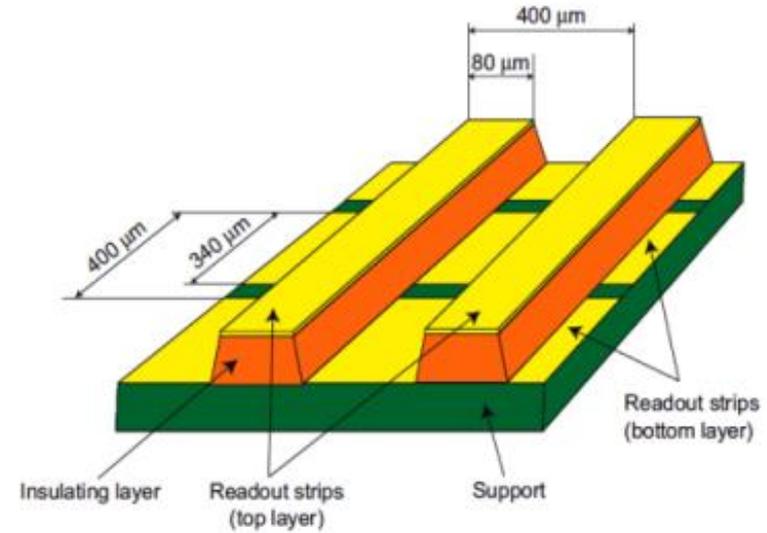
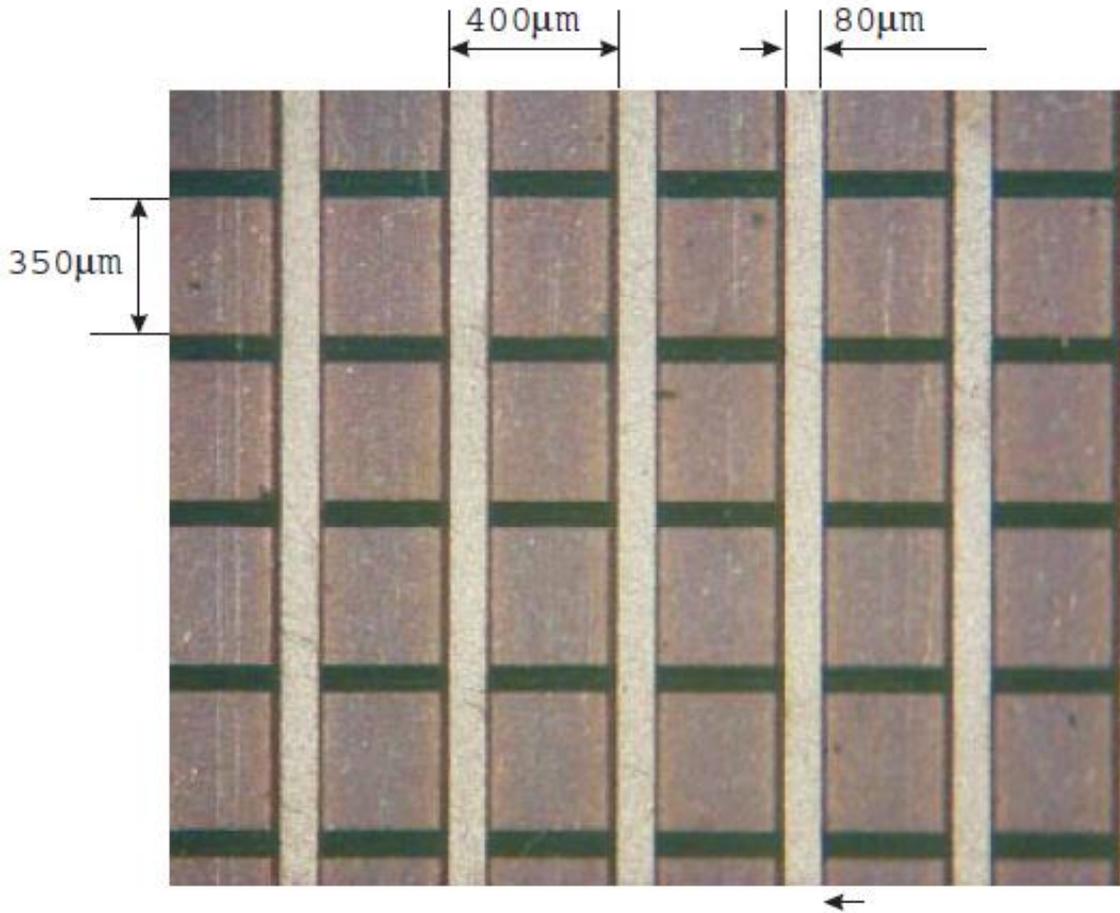
Possible candidates:

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

Under investigation

COMPASS Readout Board

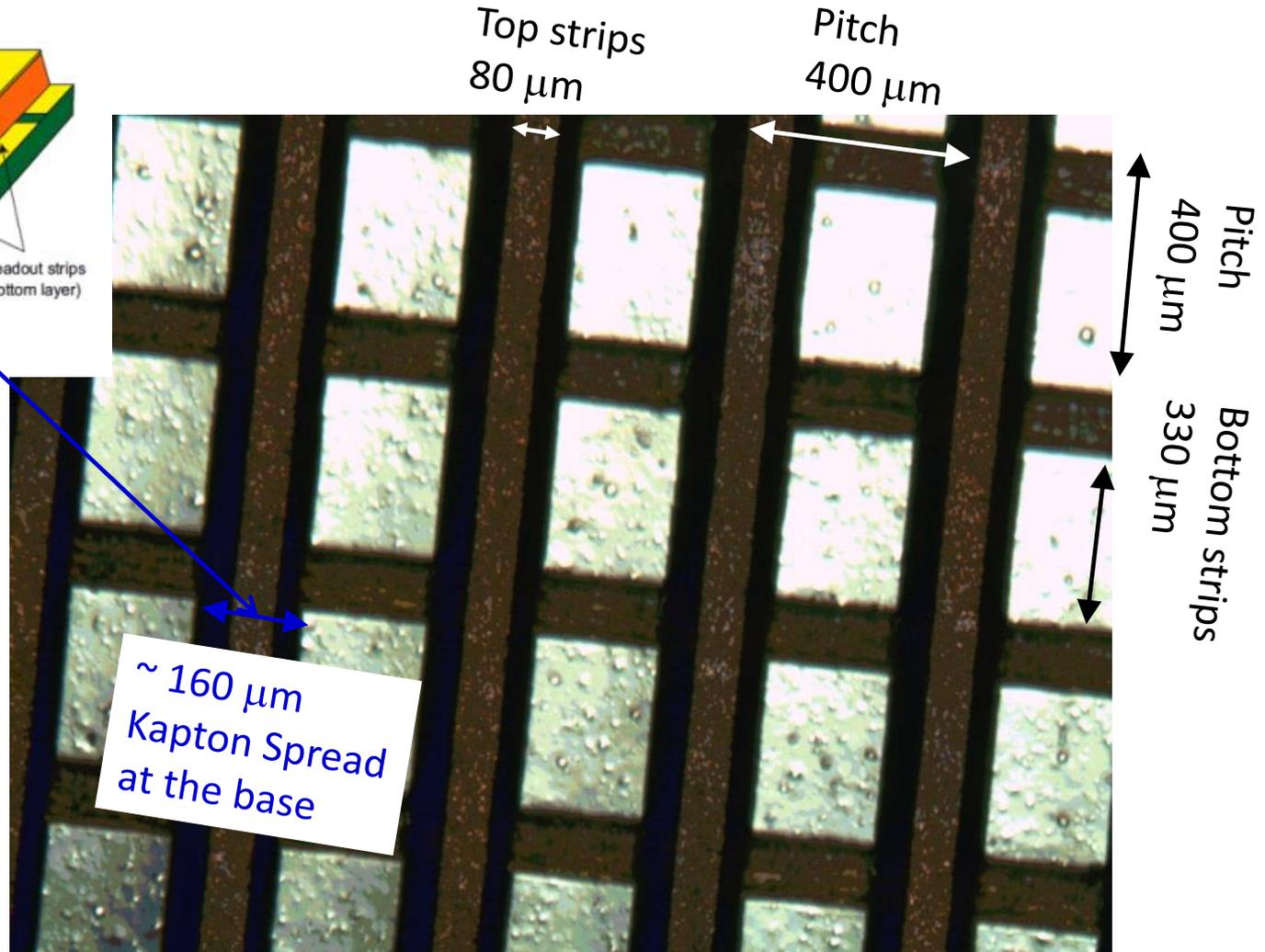
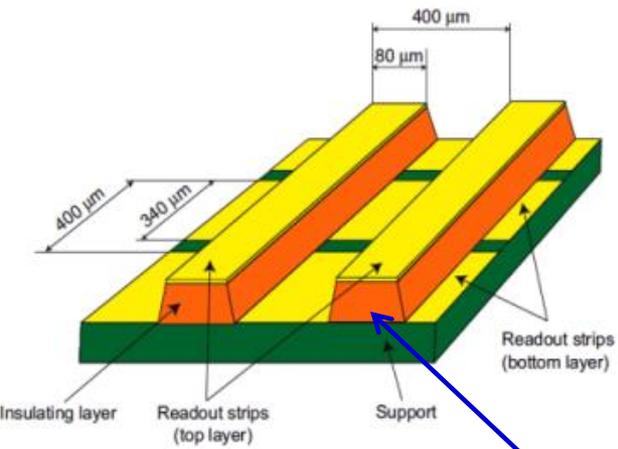
Microscope view of the COMPASS readout



- Pitch = 400 μm
- Top strips width = 50 μm
- Bottom strip width = 340 ~ 350 μm
- Kapton layer thickness = 50 μm
 - Width at the top = 80 μm
 - Width at the base should not be too much bigger than 80 μm

JLab-SBS readout board (COMPASS-like)

Microscope view of the SBS readout at CERN



Consequences of poor quality SBS Readout board

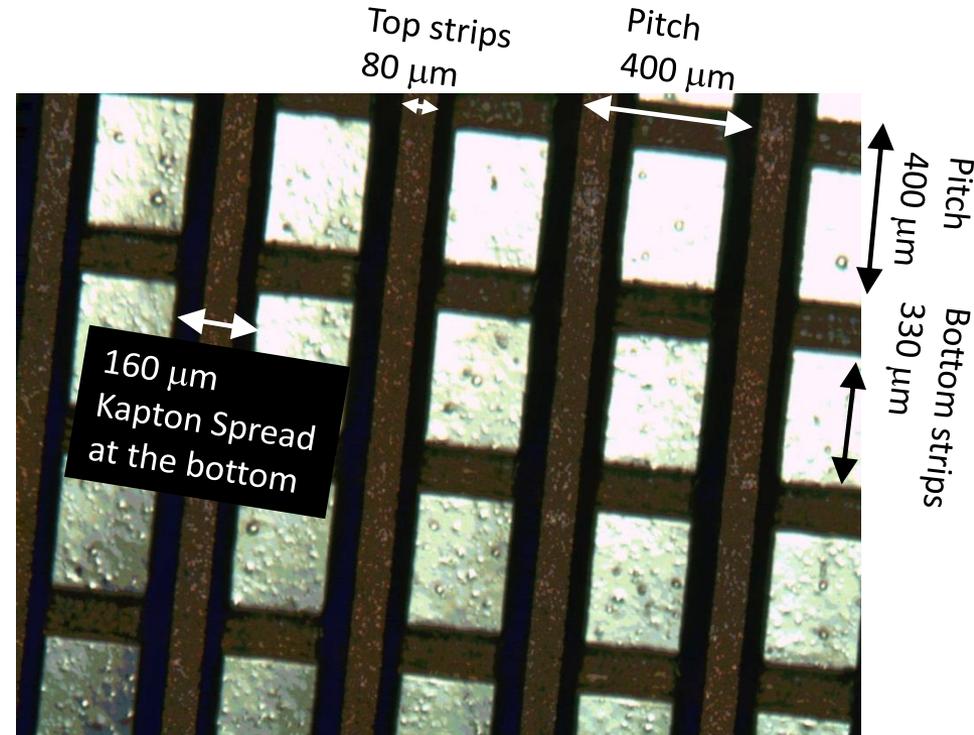
Consequences of the low quality readout production

1. Kapton spread

- bottom strip effective width is smaller than $350\ \mu\text{m}$
- Charge sharing top / Bot strips > 1
- Not critical if ratio not too high

2. Kapton spread → dielectric charging up

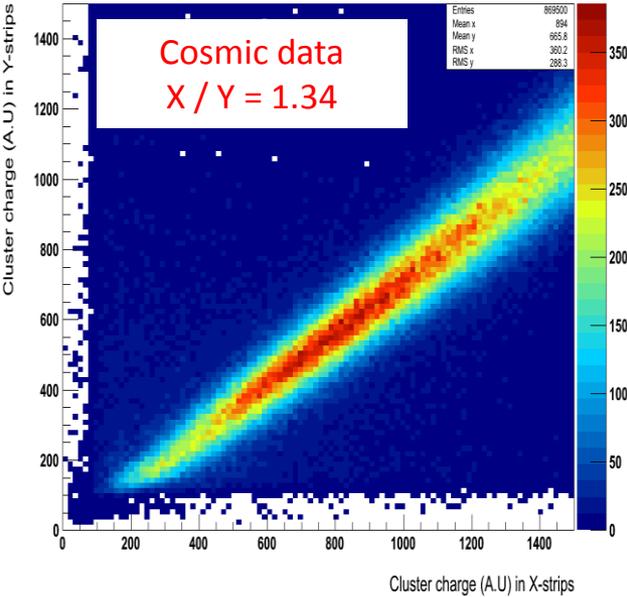
- local modification of the electric field
- bottom strip collect even less charges
- Charge ratio increases with the rate
- very critical at SBS rate level



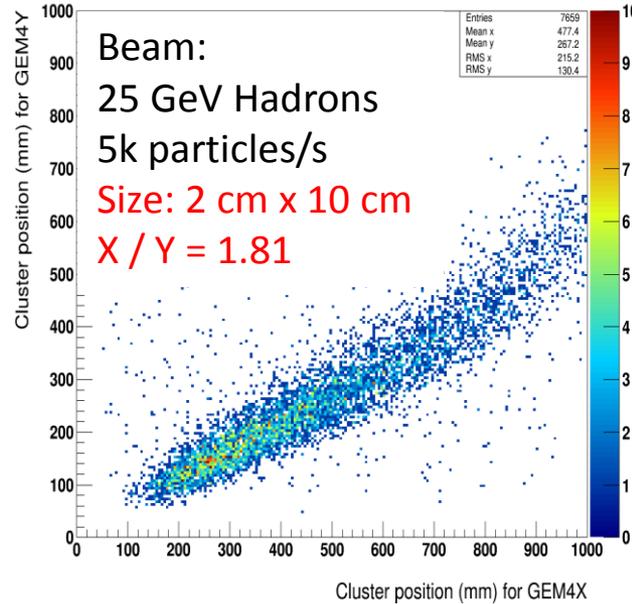
Big variation of the charge sharing fat different rate

poor production quality of SBS readout board

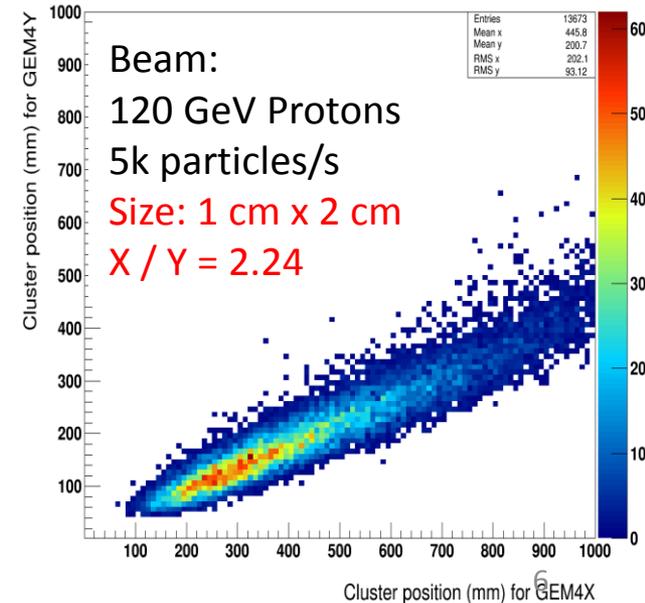
SBS 50 x 50 cm² GEM1 2D Charge Sharing



SBS1 cluster Charge Sharing



SBS1 cluster Charge Sharing



Readout board quality for the future

@ CERN

- Pay more attention during production to the quality of the R/O board
- Reduce the kapton layer width to 90 micron (maximum)

In our detector lab @ UVa

- Acquire a microscope to check the R/O when we receive it from CERN
- Set up a test bench to measure the noise distribution of the R/Os before assembly
- Want to be able to test in a high rate environment the next chamber we are going to build against the current prototype.
- Is there anyone interested in another test beam at FNAL in the coming 2-4 months?