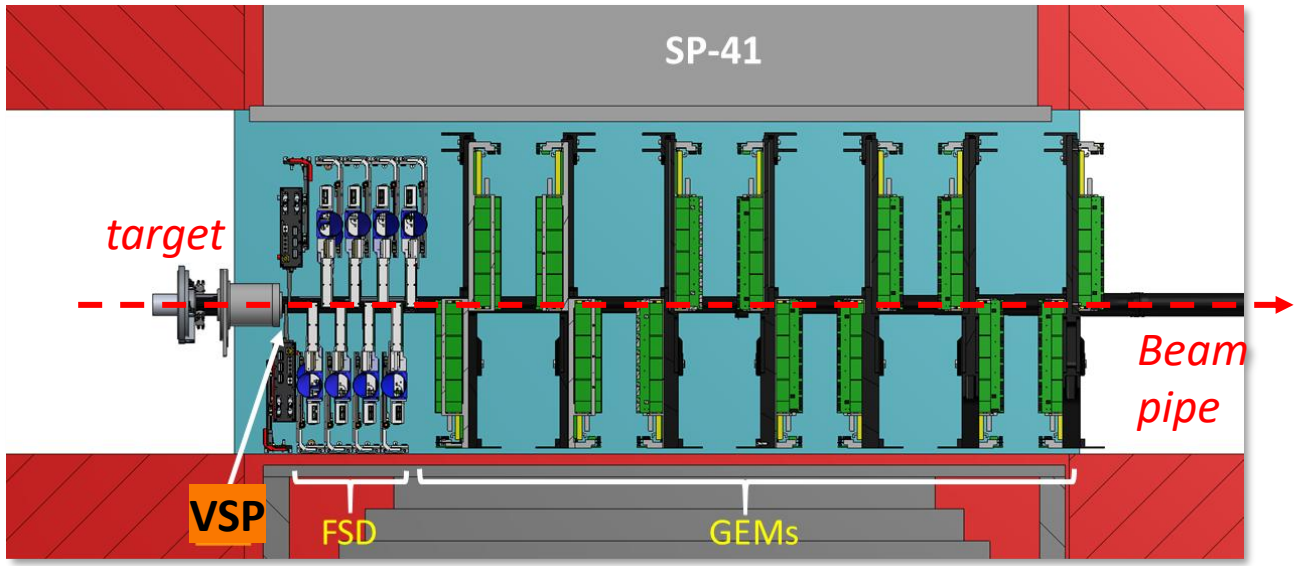
Status of the Vertex Silicon Plane

Dementev Dmitrii for STS team

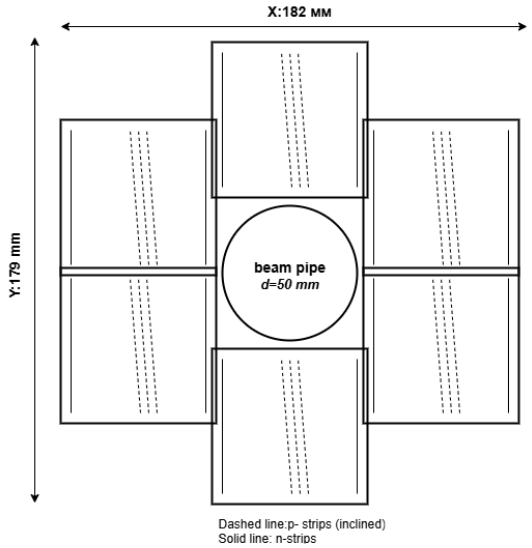
BM@N Detector and Analysis meeting, 24 Feb – 2 Mar 2026, Dombai



Central Tracking System of BM@N Experiment



Central Tracking system of BM@N



Layout of the station

- Strip pitch: 58 μm;
- Stereo angle: 7.5 °;
- Number of channels: ~12k.

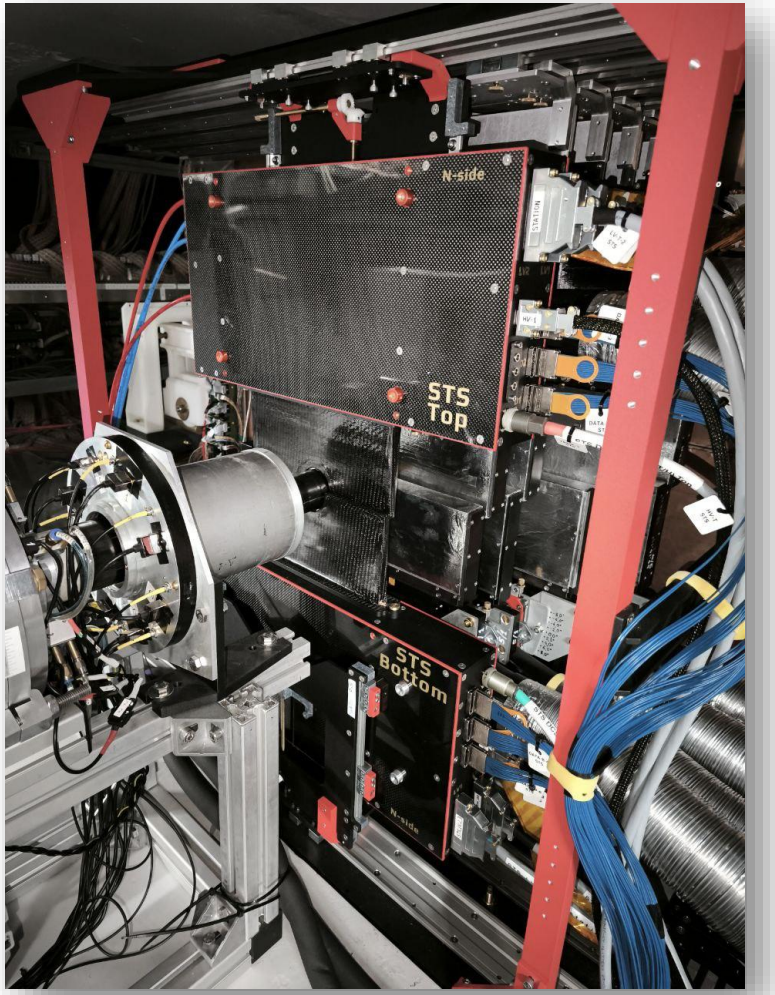
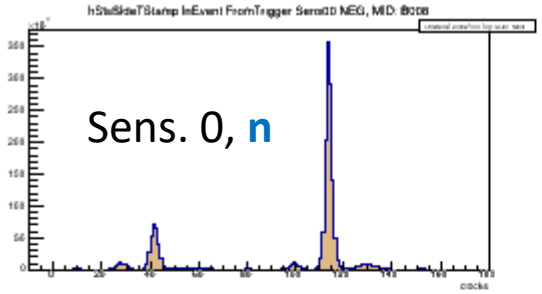


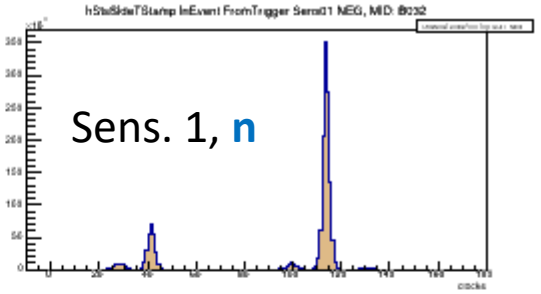
Photo of the VSP installed inside SP-41 Magnet

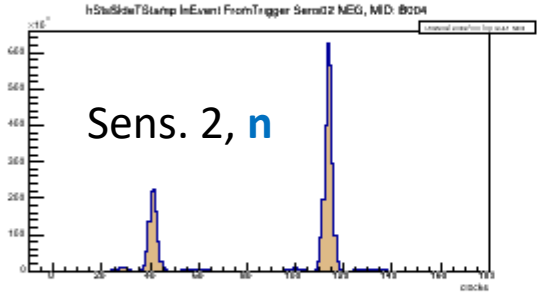
Main goals for the Run9

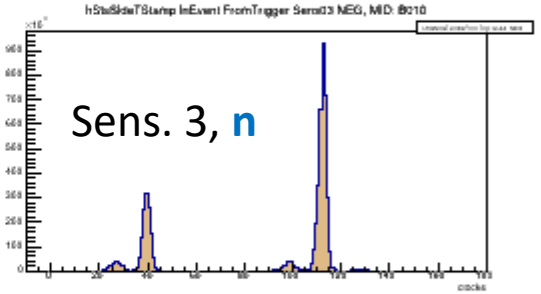
- Demonstrate integration of the STS readout into BM@N DAQ;
    - Free-streaming front end readout with individual RunControl and Event Building
- Improve vertex and momentum resolution for the particles at midrapidity range;
- Explore potential future upgrade of the vertex detector for BM@N.

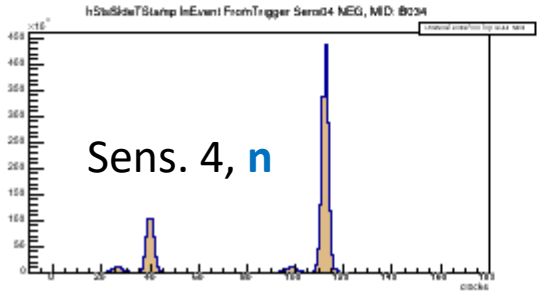
Online data QA: time correlations with trigger

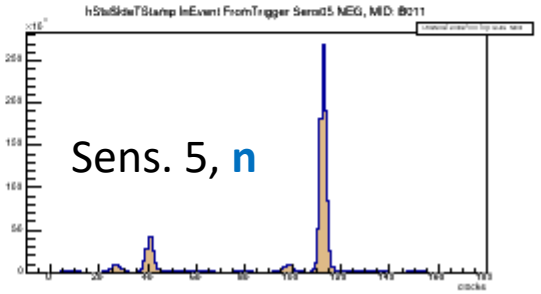




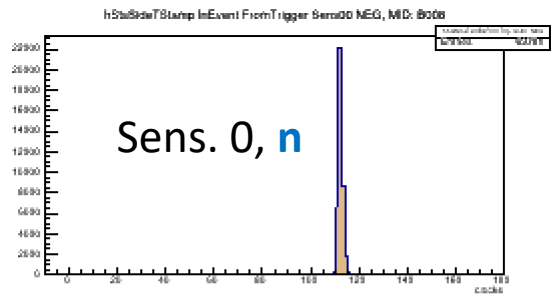


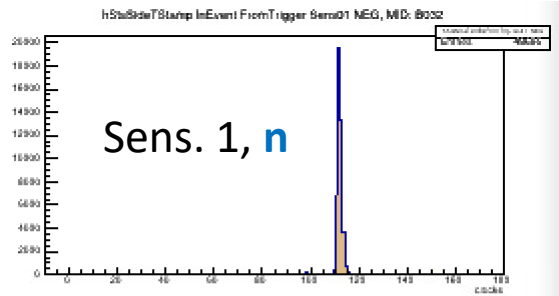


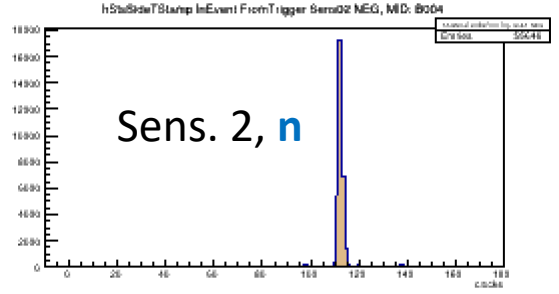


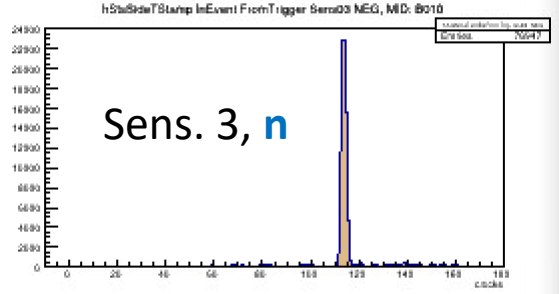


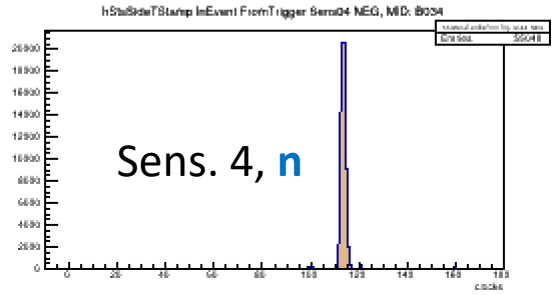
Run 9020 (18.01.2026)

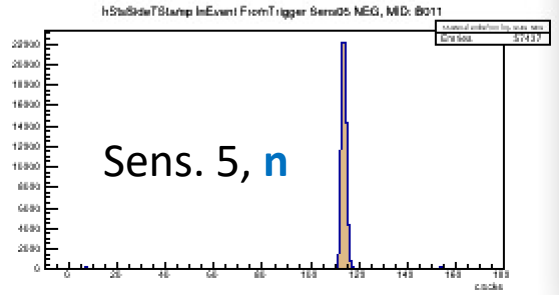






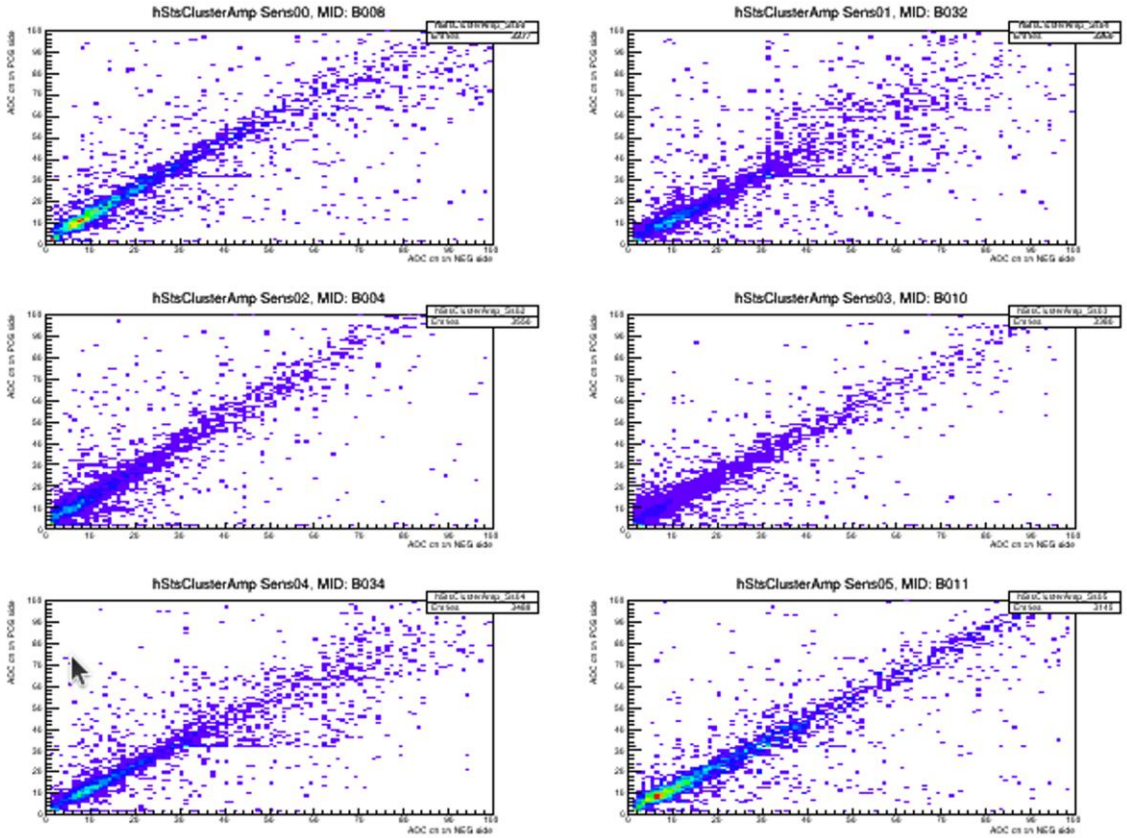


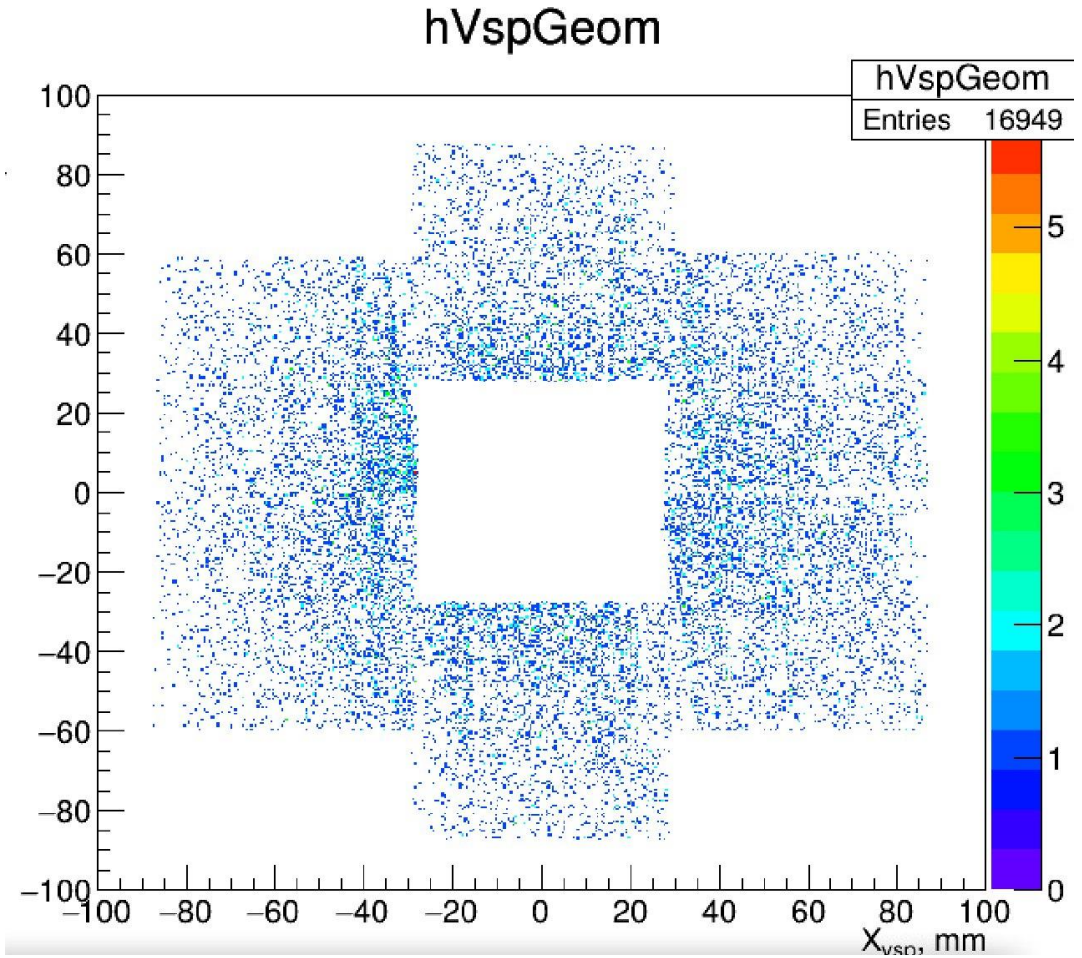




Run 9757 (27.02.2026)

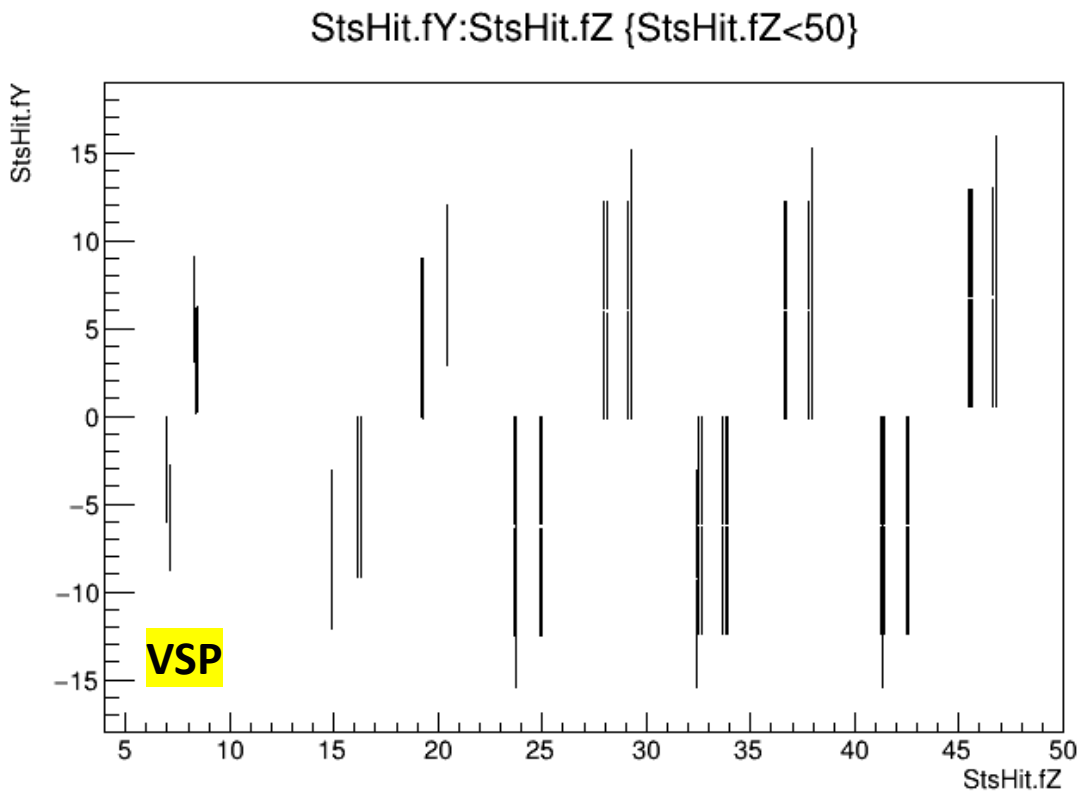
Online data QA: amplitude correlations

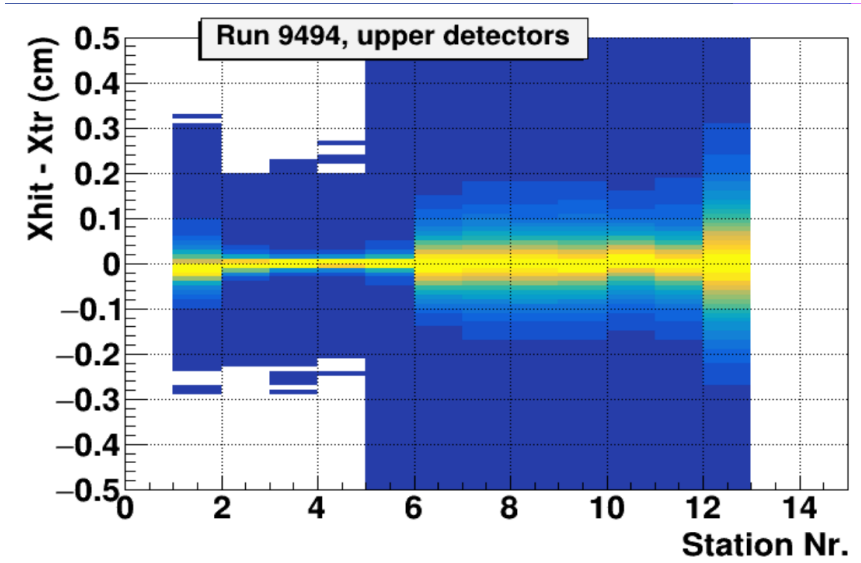


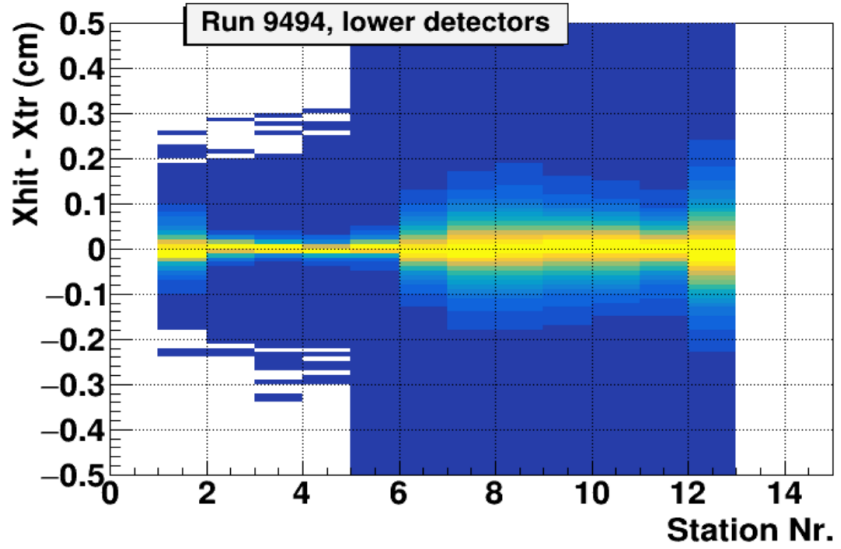


Run 9757 (27.02.2026)

Track matching

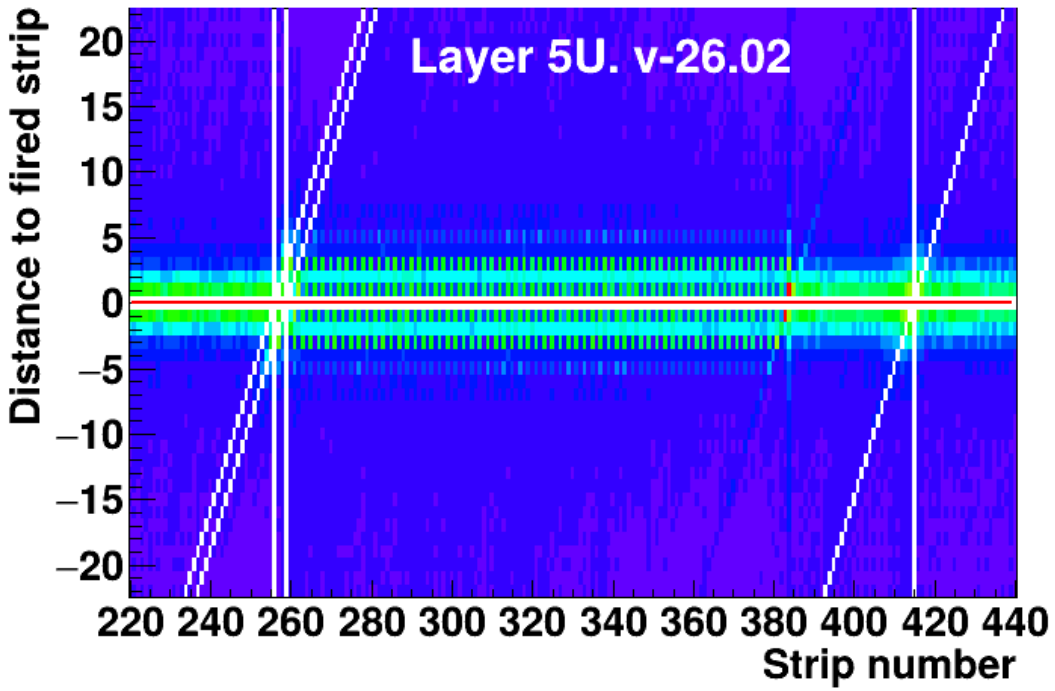


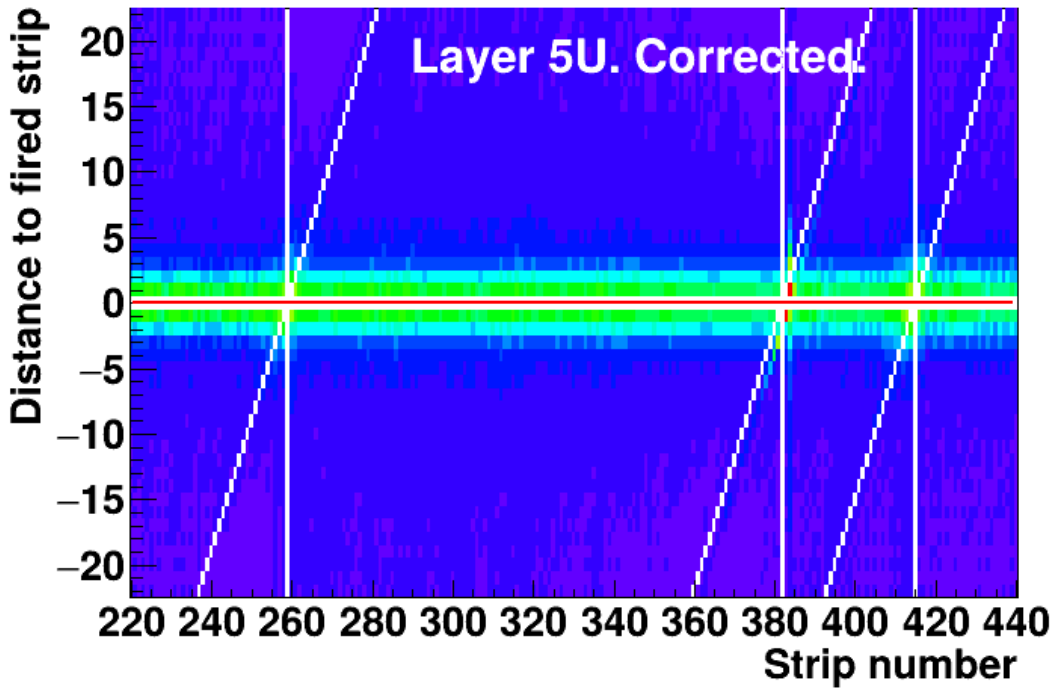




From the talk by A. Zinchenko

Mapping crosscheck



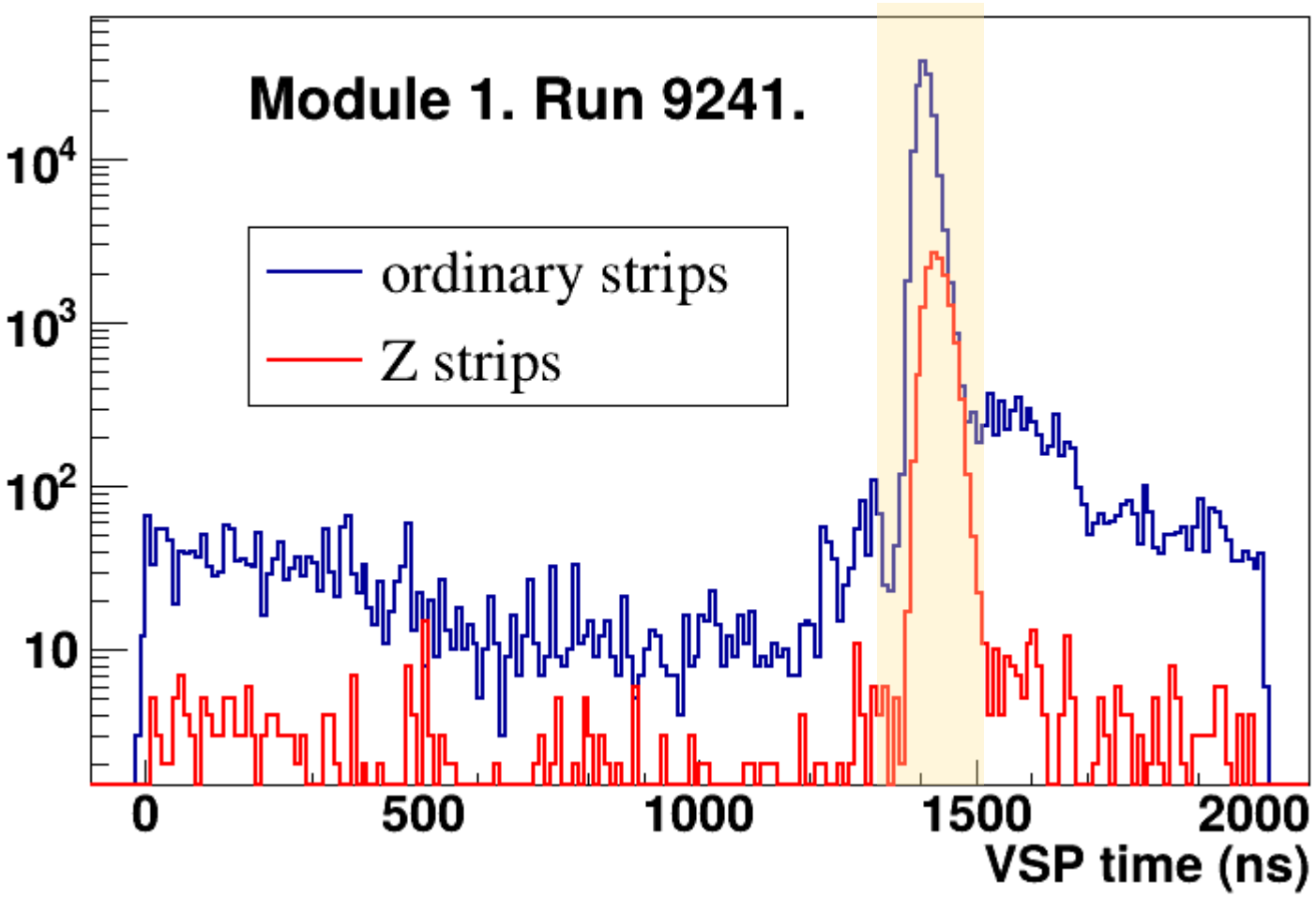


6 strip map corrections are required:

- 1X - strips [0-127], 3X – [0-127],
- 1U - [0-127], 3U – [384-511],
- 5U – [256-383], 5U – [512-639]

Analysis made by I. Rufanov

VSP timing



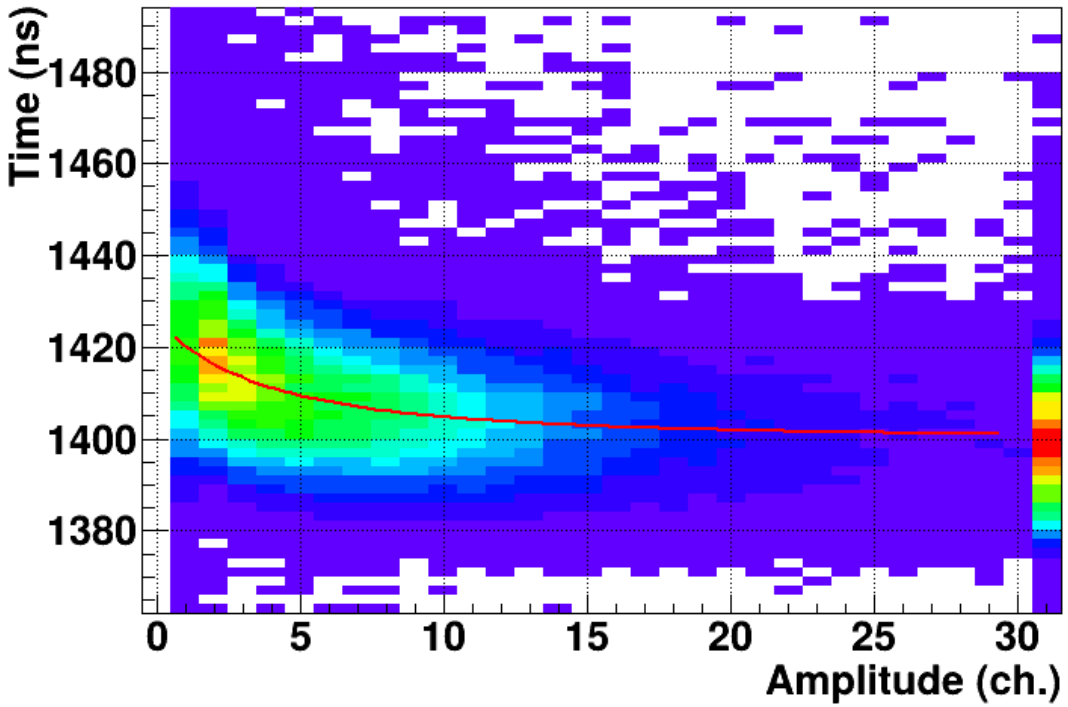
Time window: 2 us

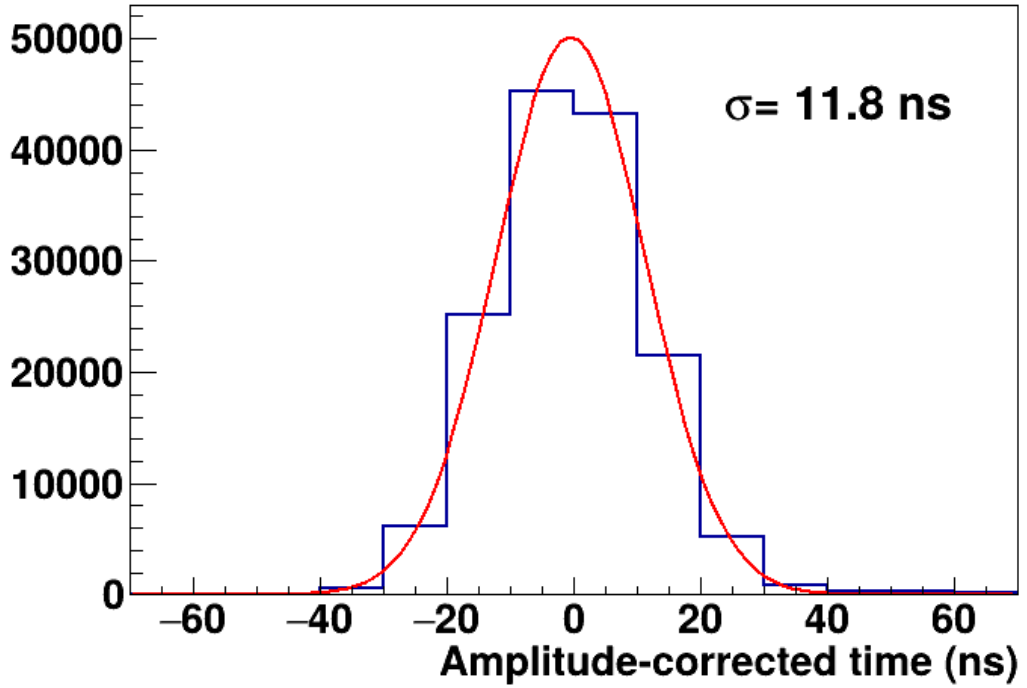
Time information could be used to resolve pileups in the tracking system at high intensities

Currently the VSP timestamp information presents ONLY in DIGI files!

Analysis made by I. Rufanov

VSP timing





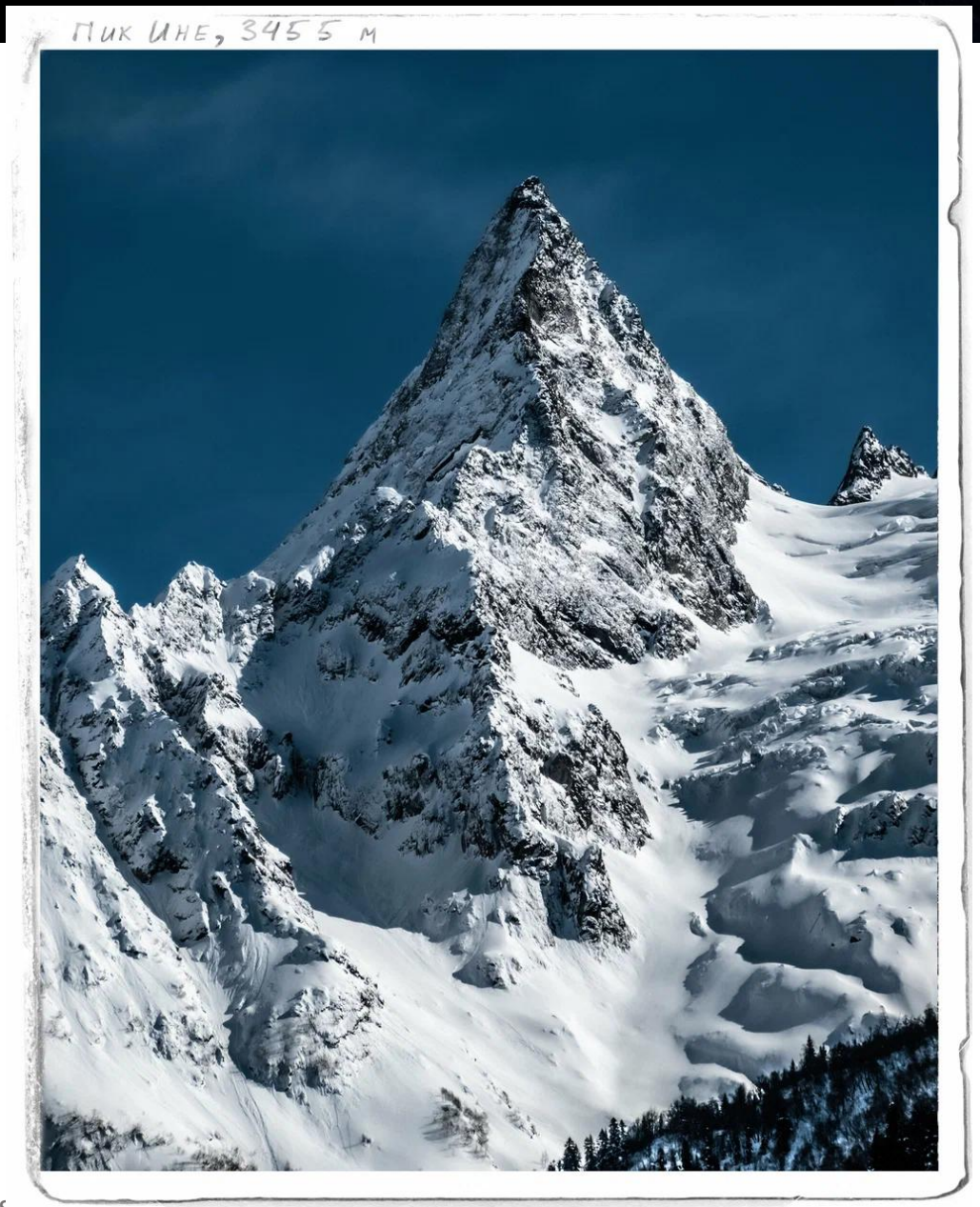
Time resolution ~12 ns

Analysis made by I. Rufanov

Conclusion

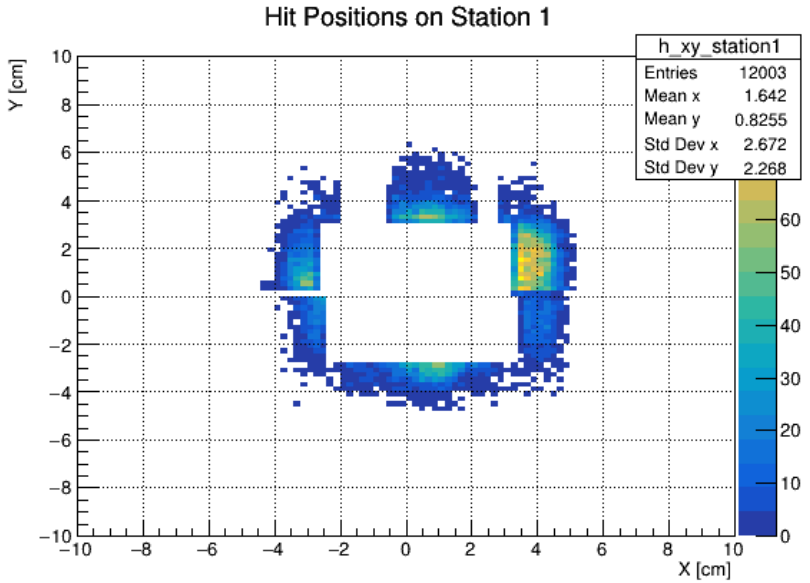
- VSP readout successfully integrated into BM@N DAQ;
- VSP Hits match with STS tracks;
- TBD Software:
  - Crosscheck of the mapping;
  - Implementation of the STS timestamp in DST files;
  - Alignment procedure;
- TBD DAQ:
  - Study of the Synch failures that happens during the start of the run

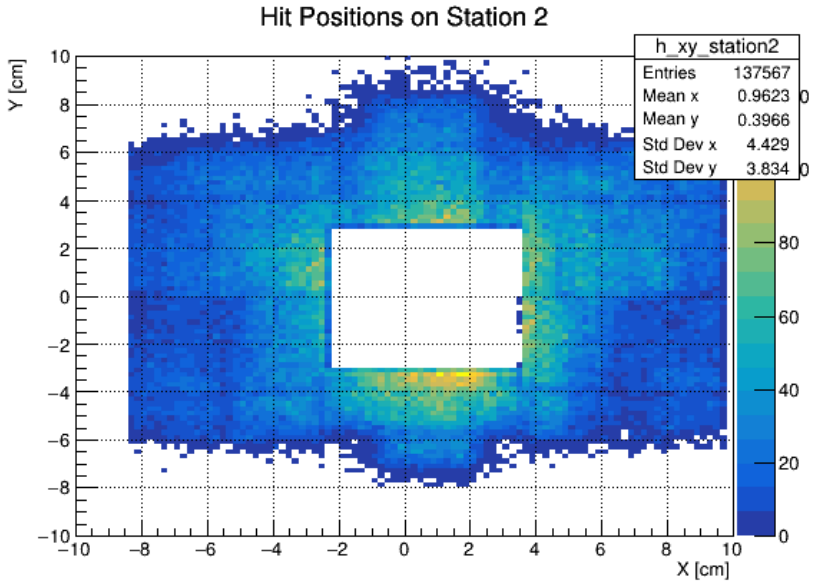
THANK YOU FOR YOUR ATTENTION!

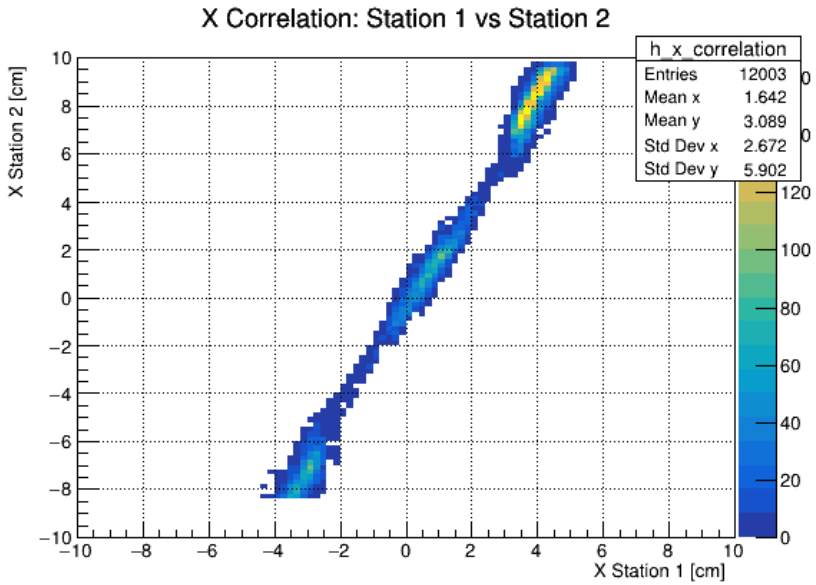


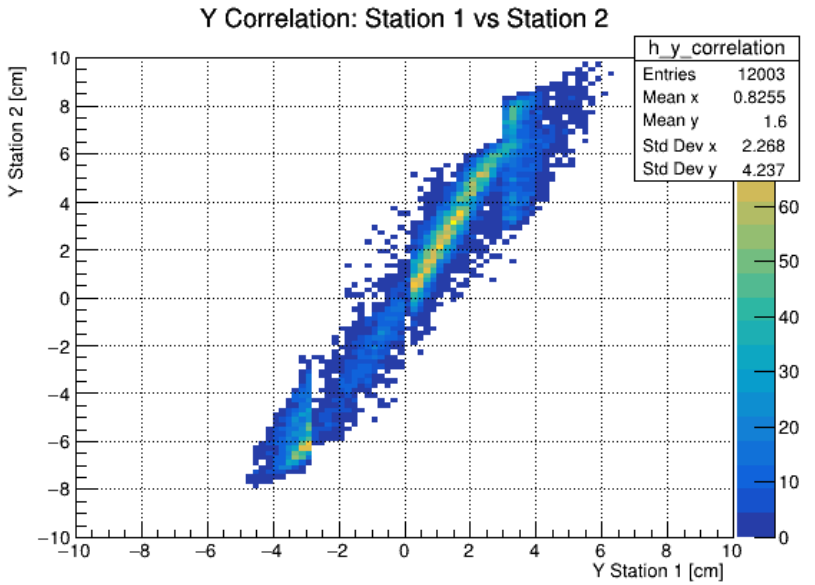
BACKUP SLIDES

Tracking

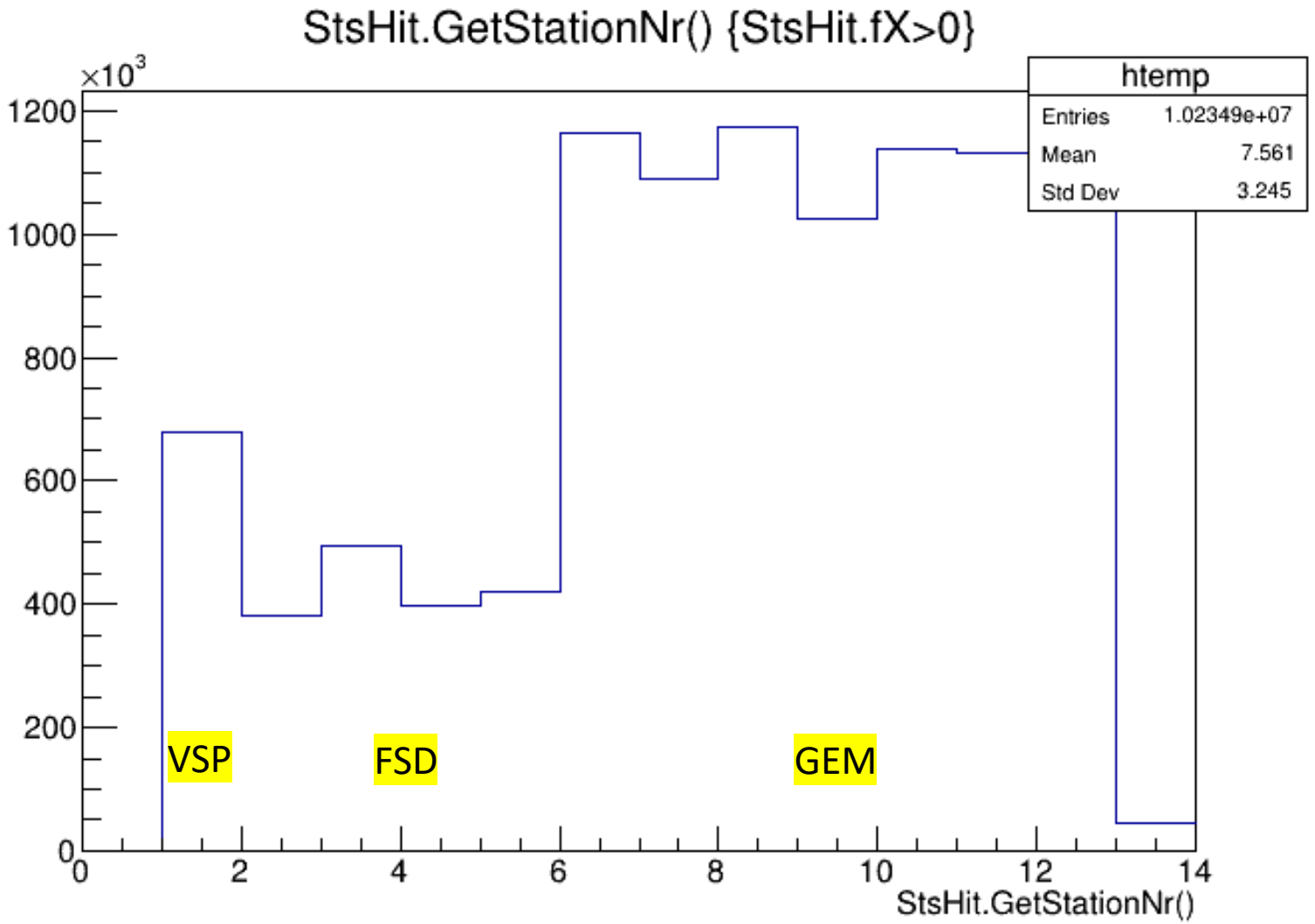

Hit Positions on Station 1
h_xy_station1
Entries 12003
Mean x 1.642
Mean y 0.8255
Std Dev x 2.672
Std Dev y 2.268
Y [cm]
X [cm]

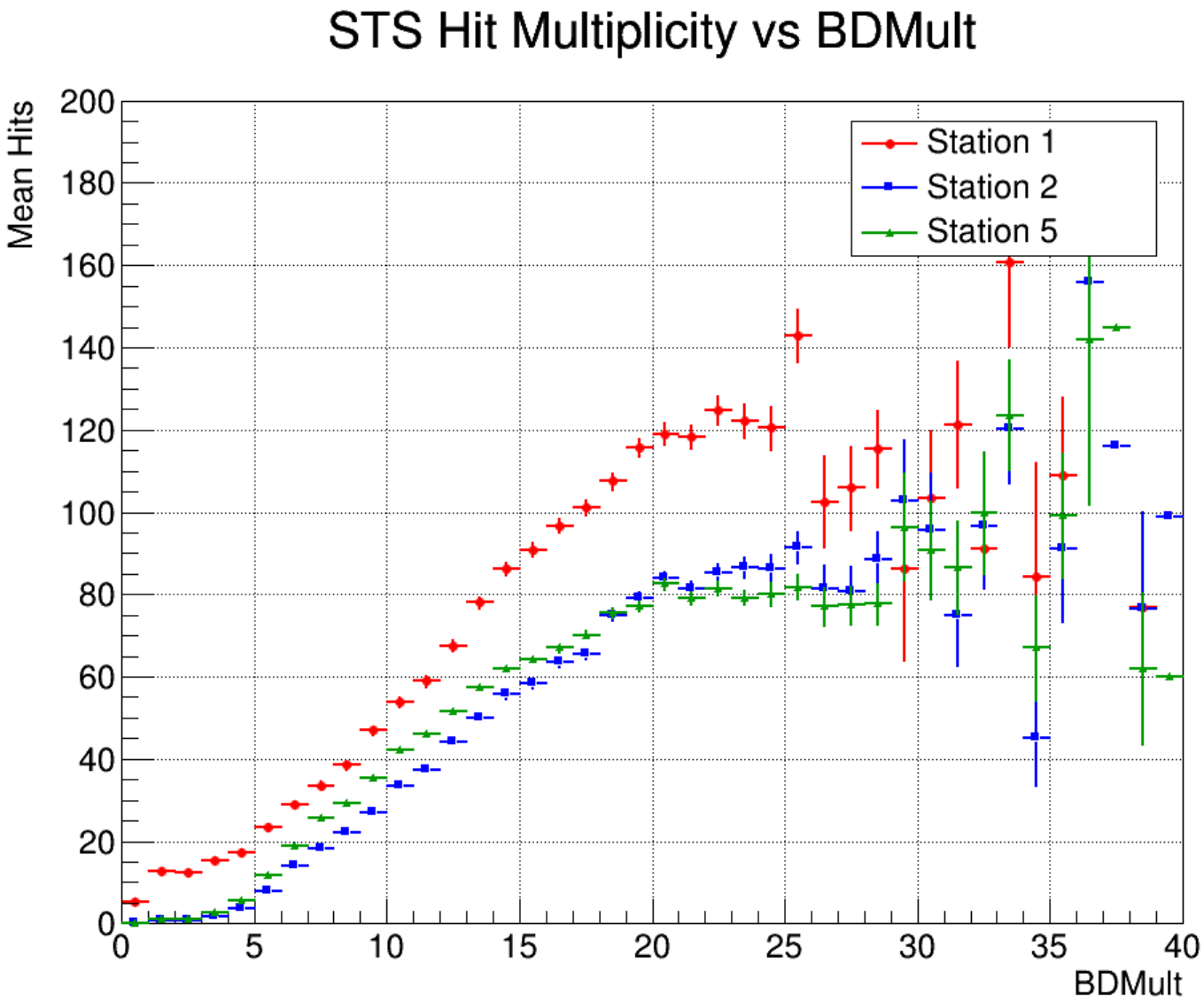

Hit Positions on Station 2
h_xy_station2
Entries 137567
Mean x 0.9623
Mean y 0.3966
Std Dev x 4.429
Std Dev y 3.834
Y [cm]
X [cm]

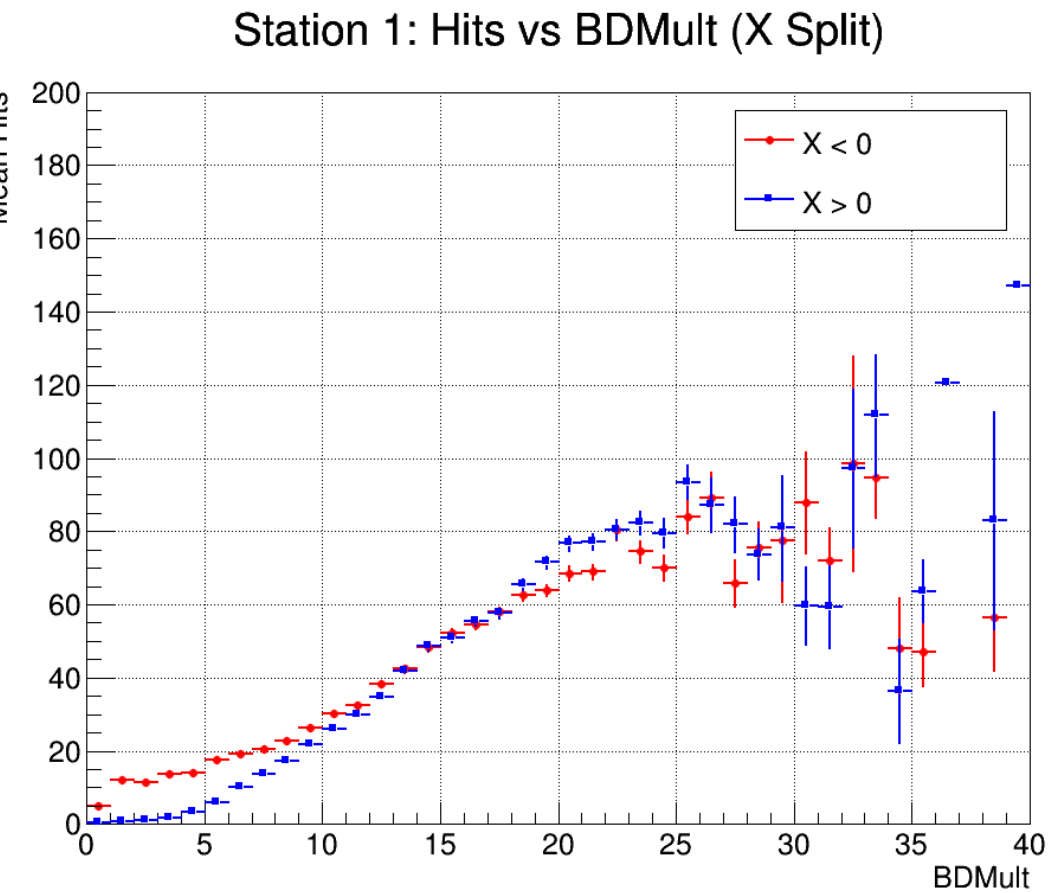

X Correlation: Station 1 vs Station 2
h_x_correlation
Entries 12003
Mean x 1.642
Mean y 3.089
Std Dev x 2.672
Std Dev y 5.902
X Station 2 [cm]
X Station 1 [cm]

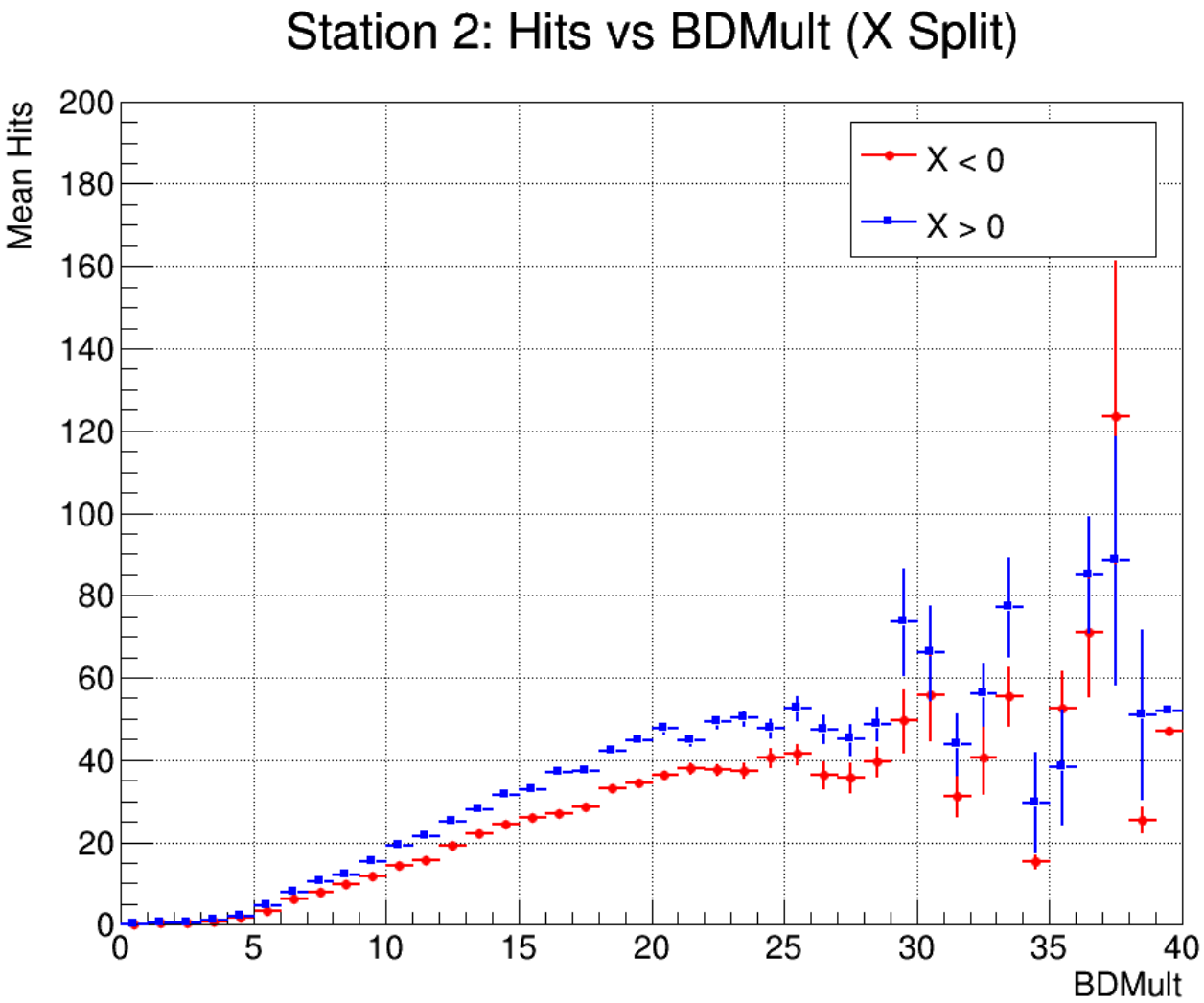

Y Correlation: Station 1 vs Station 2
h_y_correlation
Entries 12003
Mean x 0.8255
Mean y 1.6
Std Dev x 2.268
Std Dev y 4.237
Y Station 2 [cm]
Y Station 1 [cm]

STS Hits


StsHit.GetStationNr() {StsHit.fX>0}
htemp
Entries 1.02349e+07
Mean 7.561
Std Dev 3.245
×10^3
1200
1000
800
600
400
200
0
0
2
4
6
8
10
12
14
StsHit.GetStationNr()
VSP
FSD
GEM


STS Hit Multiplicity vs BDMult
Mean Hits
BDMult
Station 1
Station 2
Station 5
0
20
40
60
80
100
120
140
160
180
200
0
5
10
15
20
25
30
35
40


Station 1: Hits vs BDMult (X Split)
X < 0
X > 0
BDMult


Station 2: Hits vs BDMult (X Split)
Mean Hits
X < 0
X > 0
BDMult