

Alignment VTX-MSD @ GSI

MSD track reconstruction

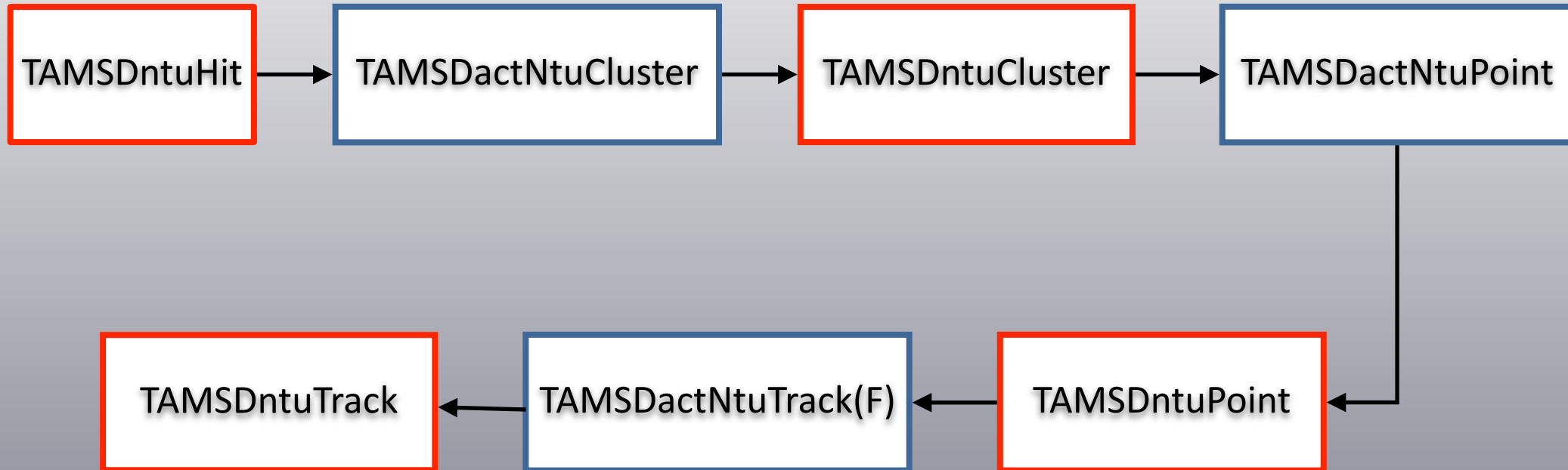
Oxygen w/o target

Oxygen with target

Conclusions

Reconstruction

↳ Scheme:



- Hits - 1D Clusters - Points - Tracks
- ➔ Add track reconstruction from points
- ➔ Need re-factoring of VTX-ITR tracking framework

Configuration file

- TAMSDdetector.cfg

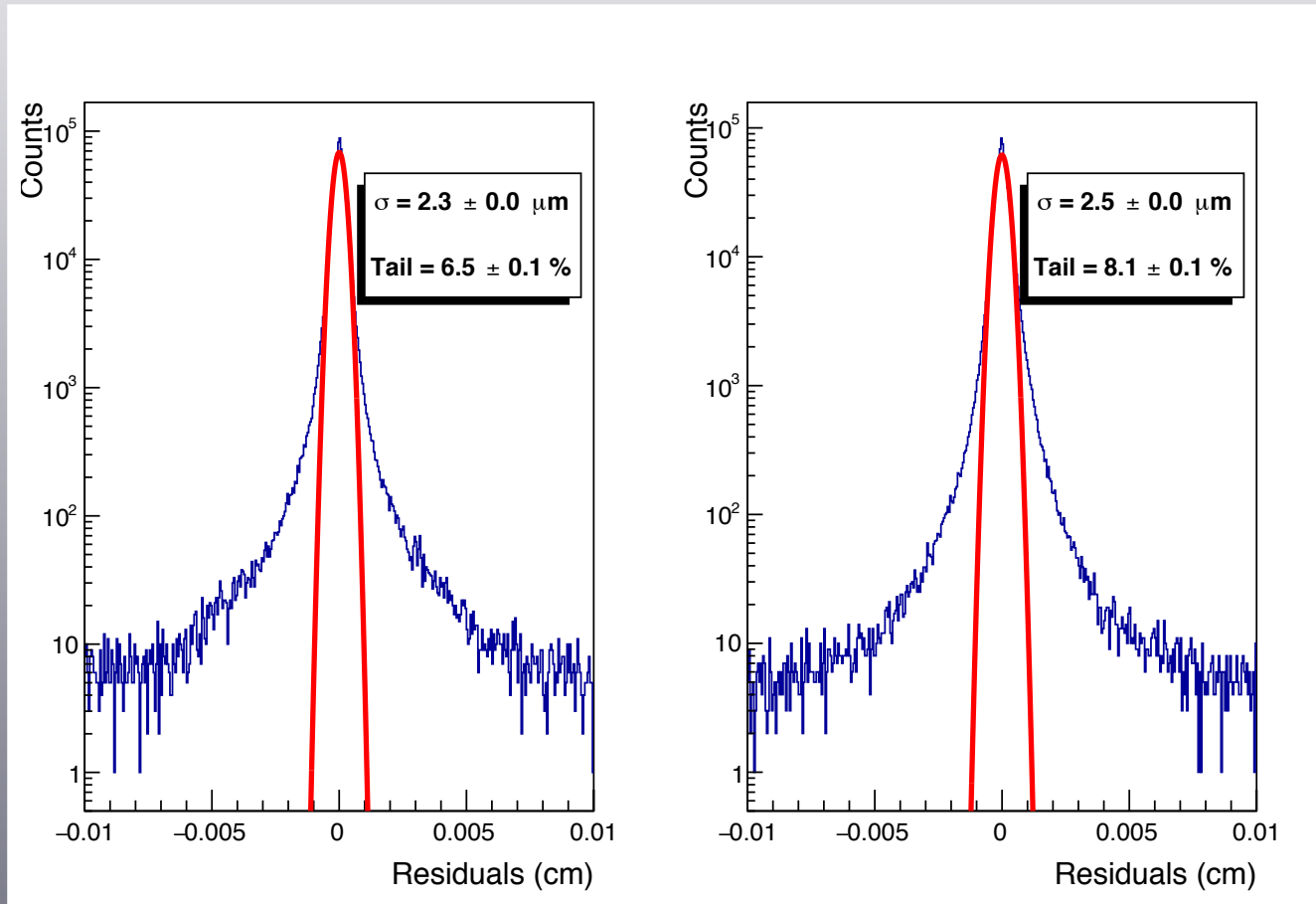
```
// -+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+
// -+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+
//
// This is a Configuration File for FOOT MicroStrip Detector
//
//
// -+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+
// Parameters for Analysis
// -+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+-+-+-+-+-----+
PlanesForTrackMinimum:      3
SearchHitDistance:        0.06
Sensors:                      6
```

- Add minimum number of planes for tracking
- Add minimum distance of points to track

Run 4287

Oxygen w/o target

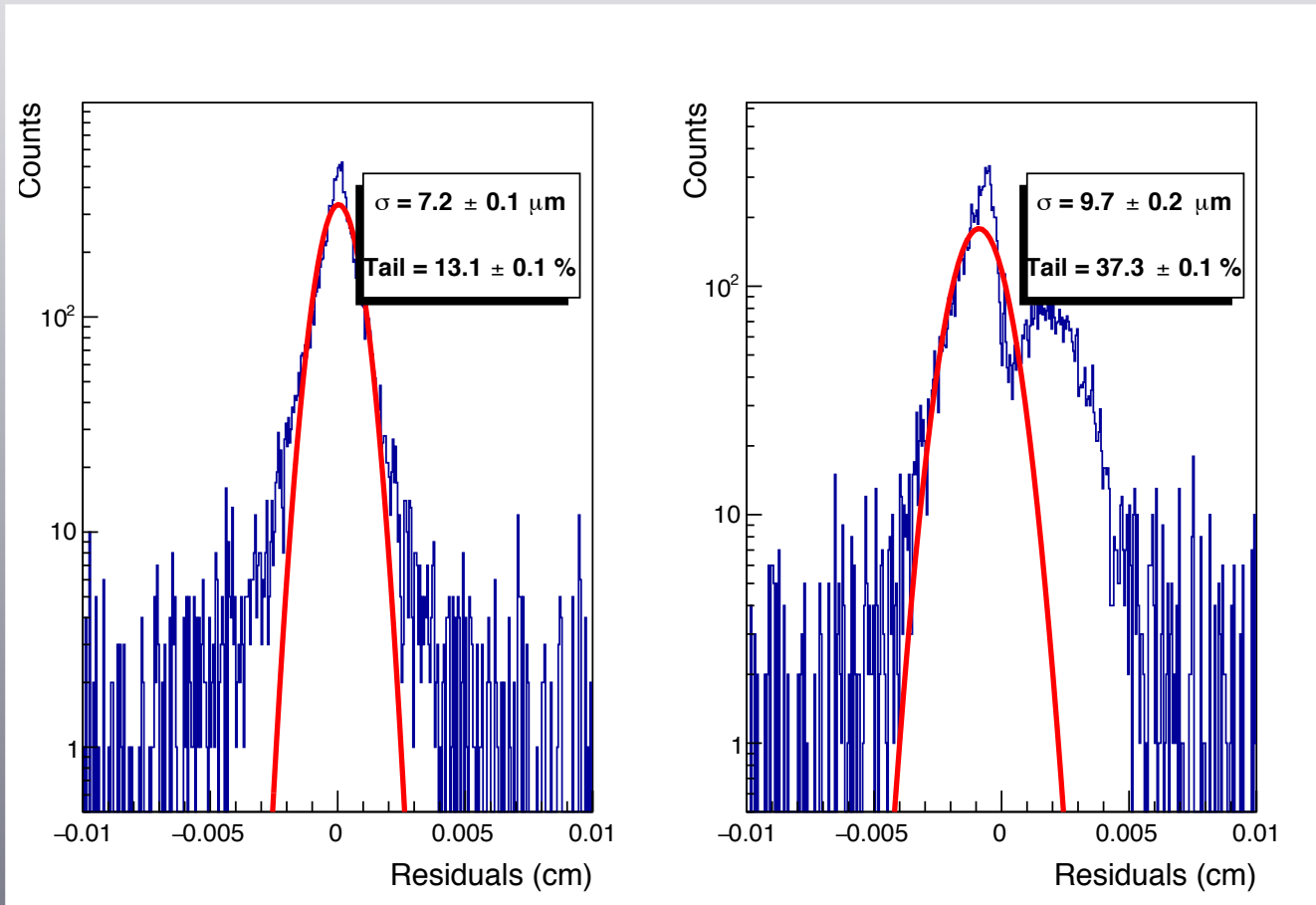
• VTX alignment (cluster size > 20):



➡ Good alignment !

Oxygen w/o target (i)

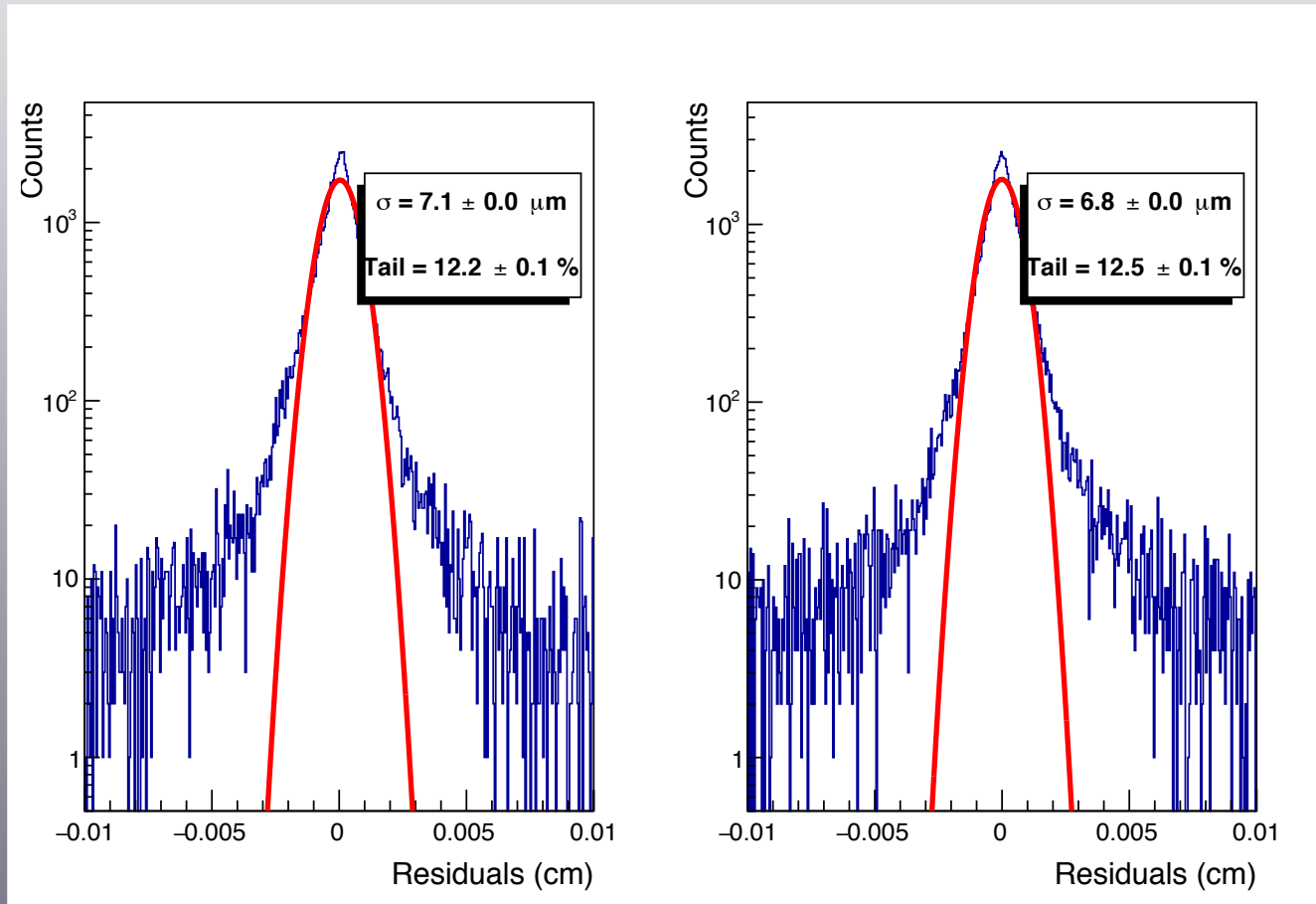
• MSD alignment (i):



➡ Bad alignment in Y !

Oxygen w/o target (ii)

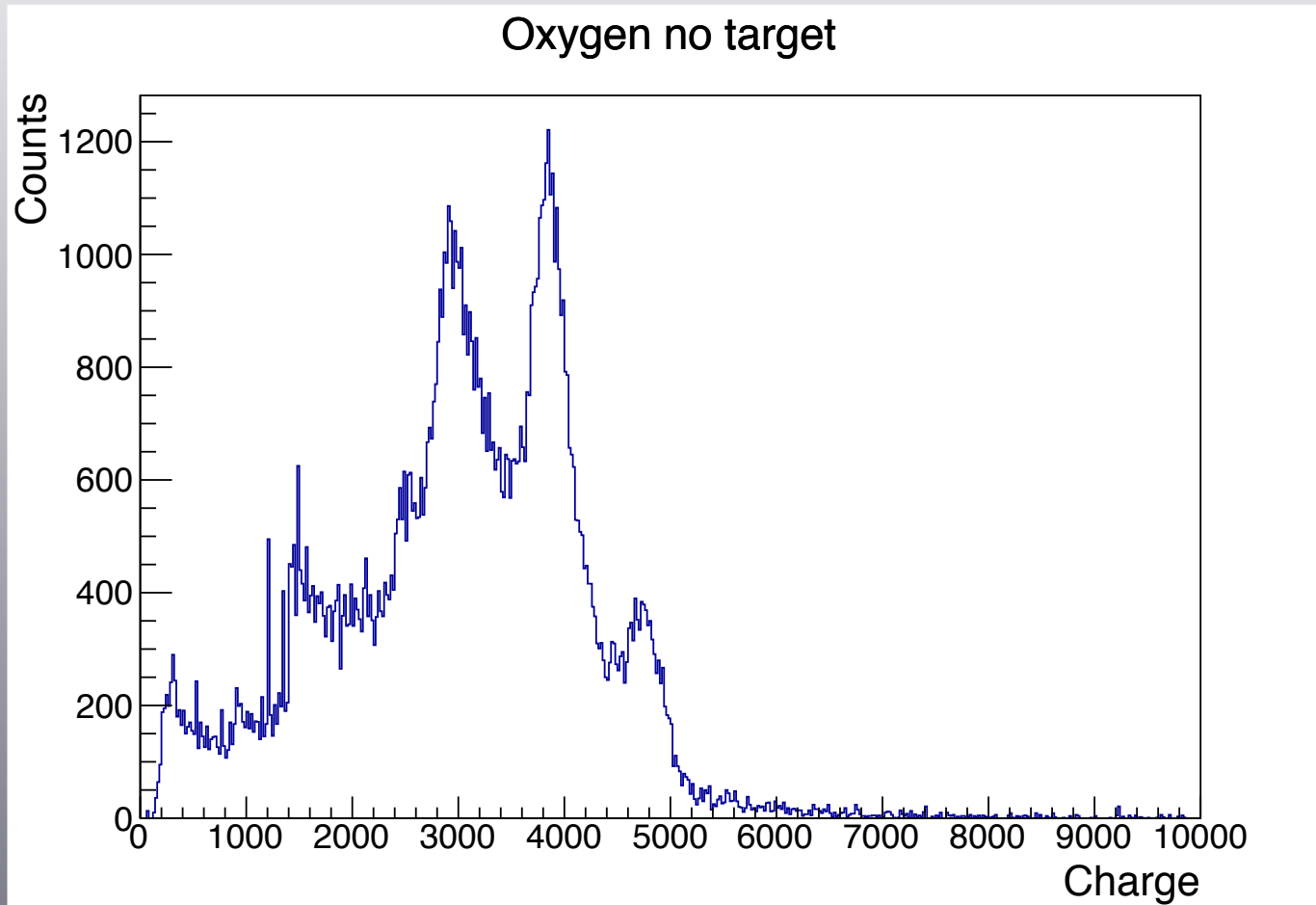
• MSD alignment (ii):



➡ Re-alignment in Y !

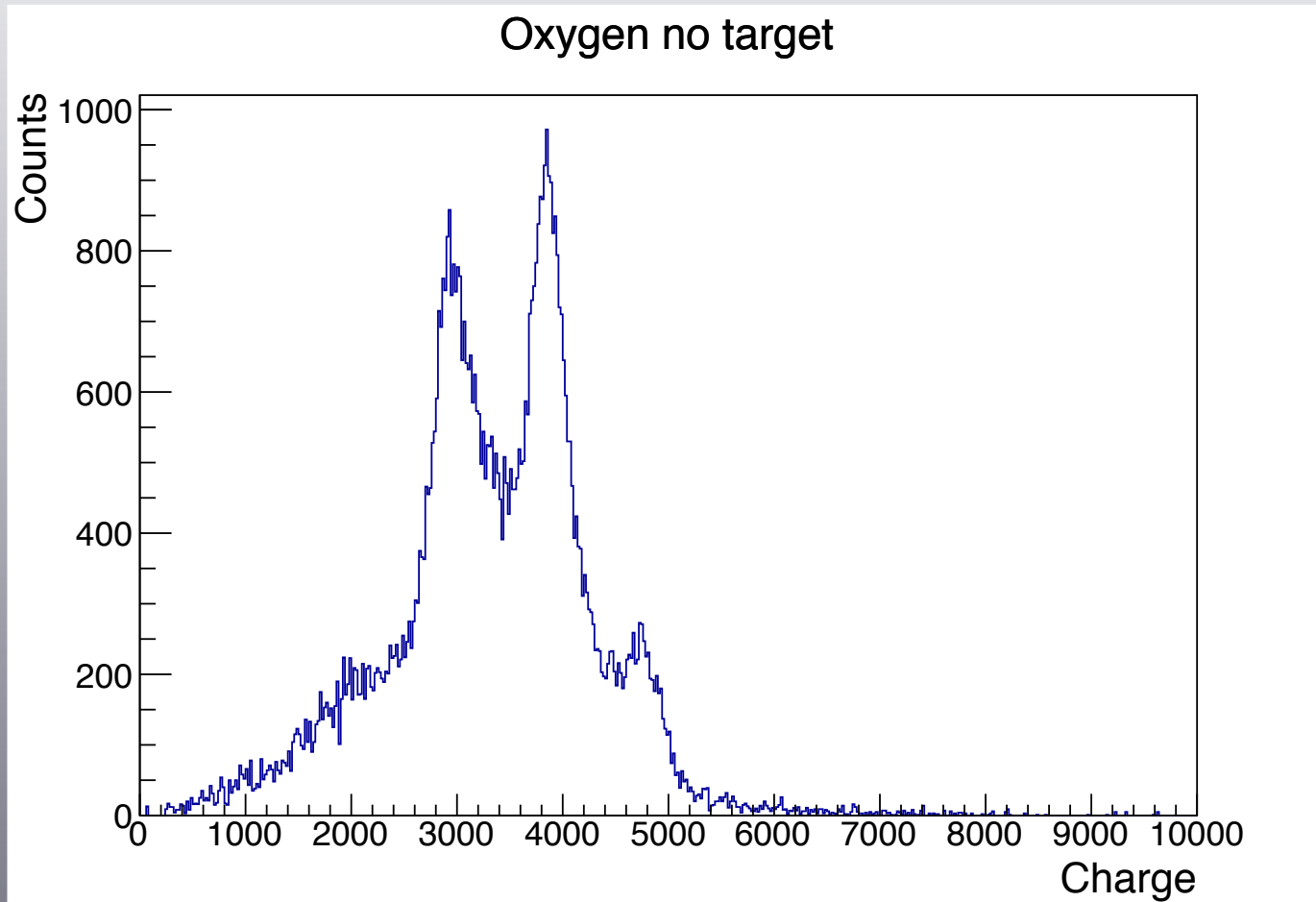
Oxygen w/o target (iii)

• Total cluster charge (sigma noise: 40):



Oxygen w/o target (iv)

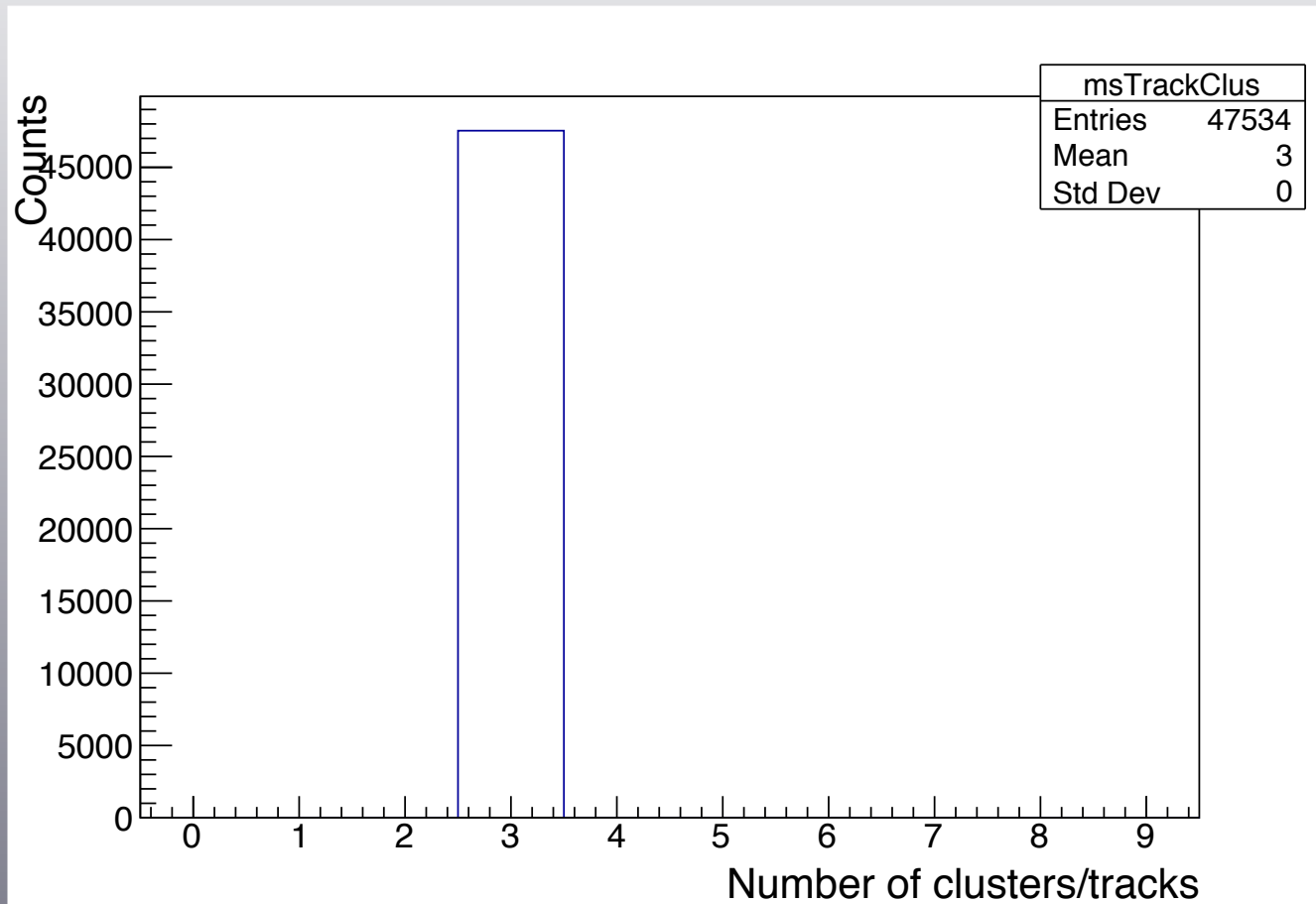
• Total tracked cluster charge (sigma noise=40):



- Remove noisy strips or real charge deposition ?

Oxygen w/o target (vi)

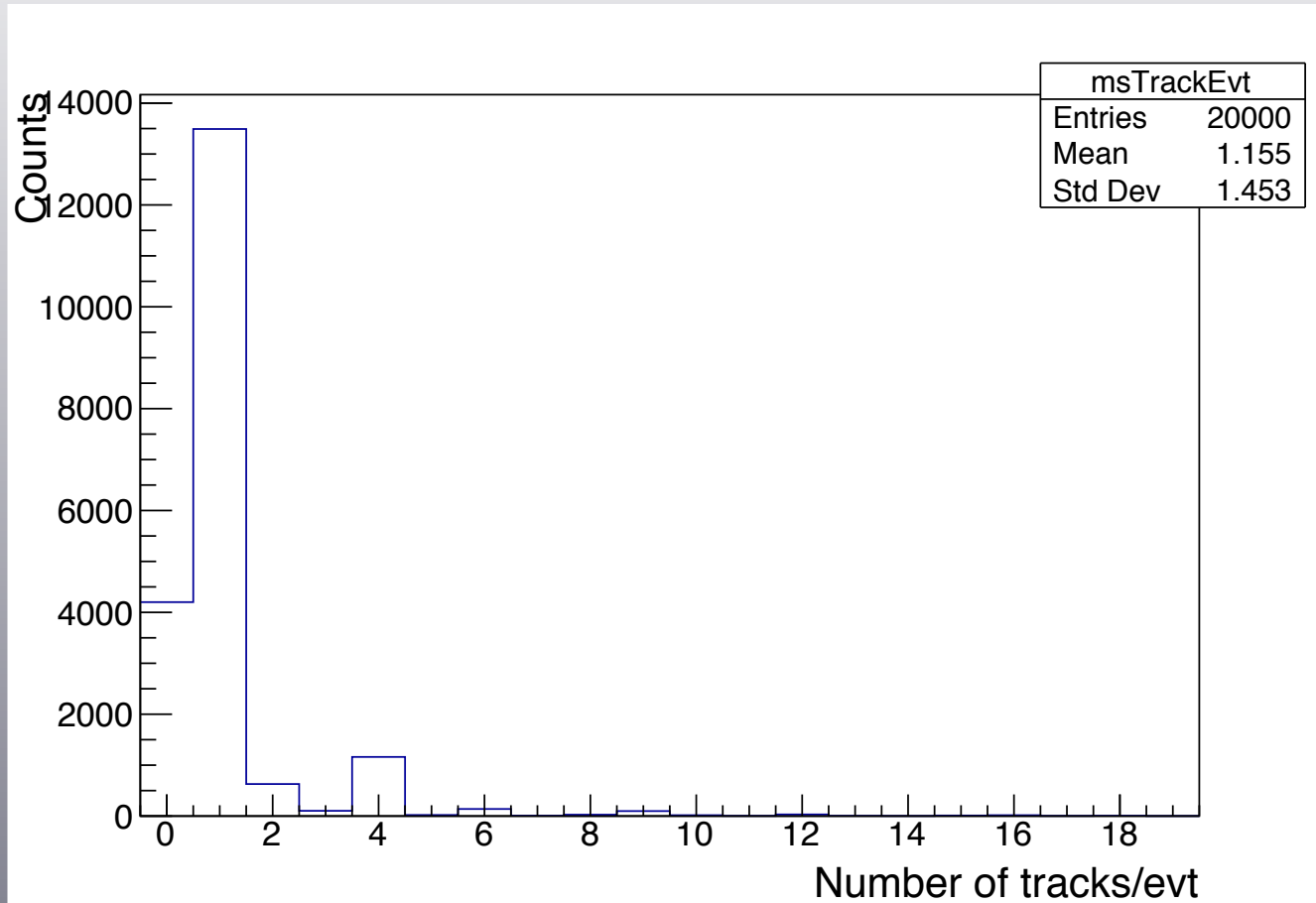
• Clusters per track:



- Ask for 3 stations

Oxygen w/o target (v)

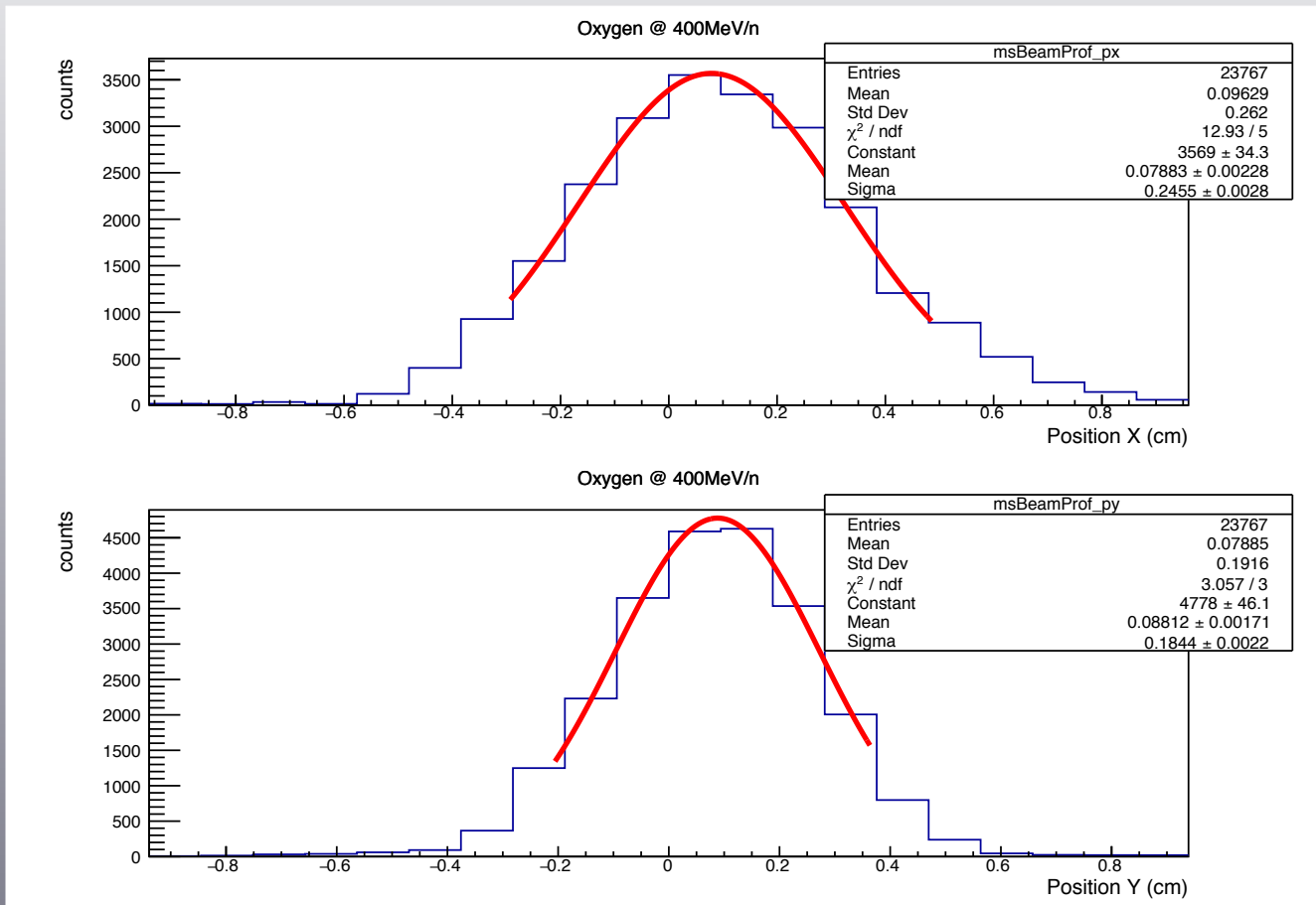
• Tracks per events:



- Tracks presence in 78.6% of cases,
- Proportion of pileup (14.3%)
- ➔ Seems to show a pattern ?

Oxygen w/o target (vii)

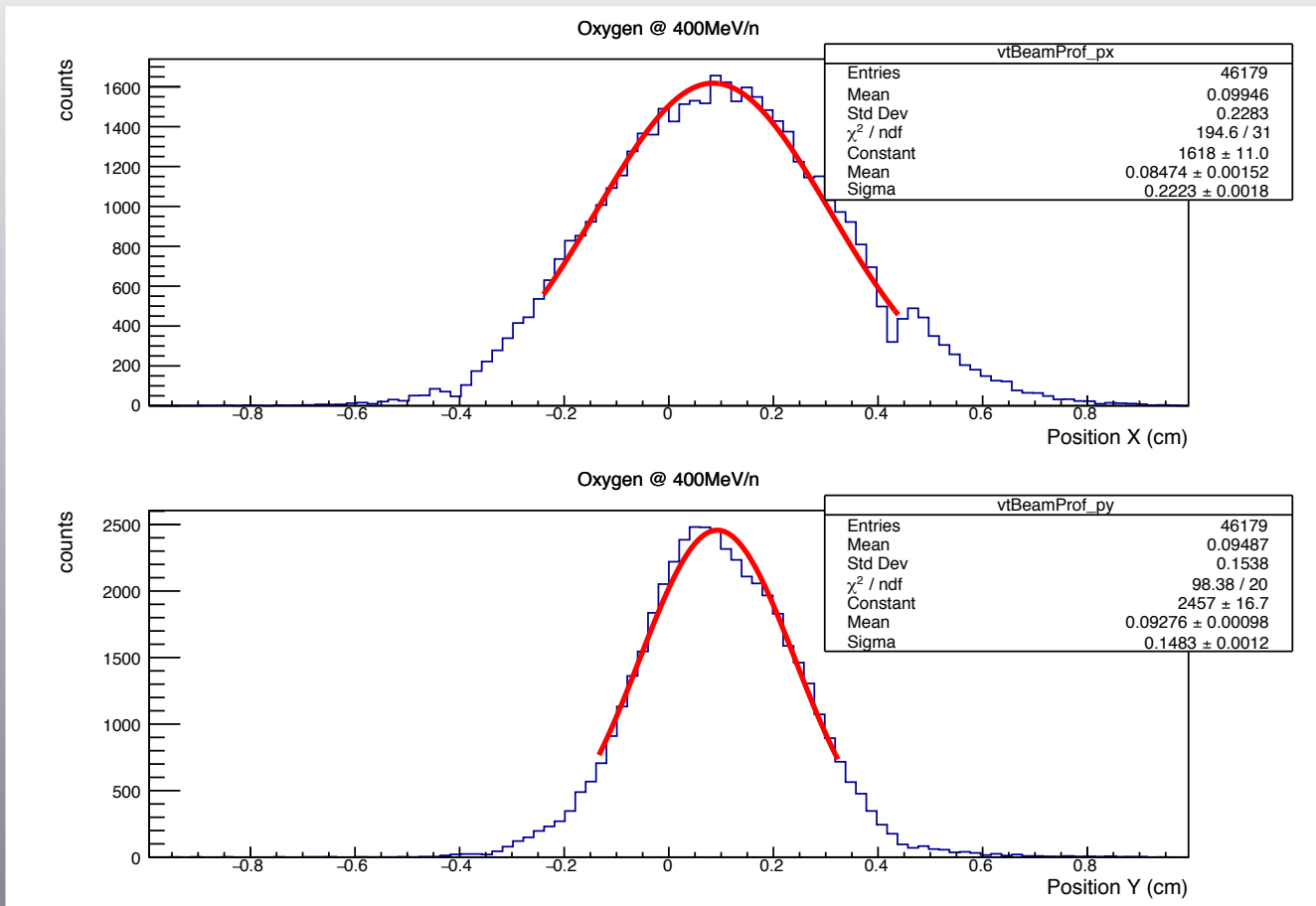
Beam Profile



- MeanX = 0.788 mm SigmaX = 2.45 mm
- MeanY = 0.881 mm SigmaY = 1.84 mm

Oxygen w/o target (viii)

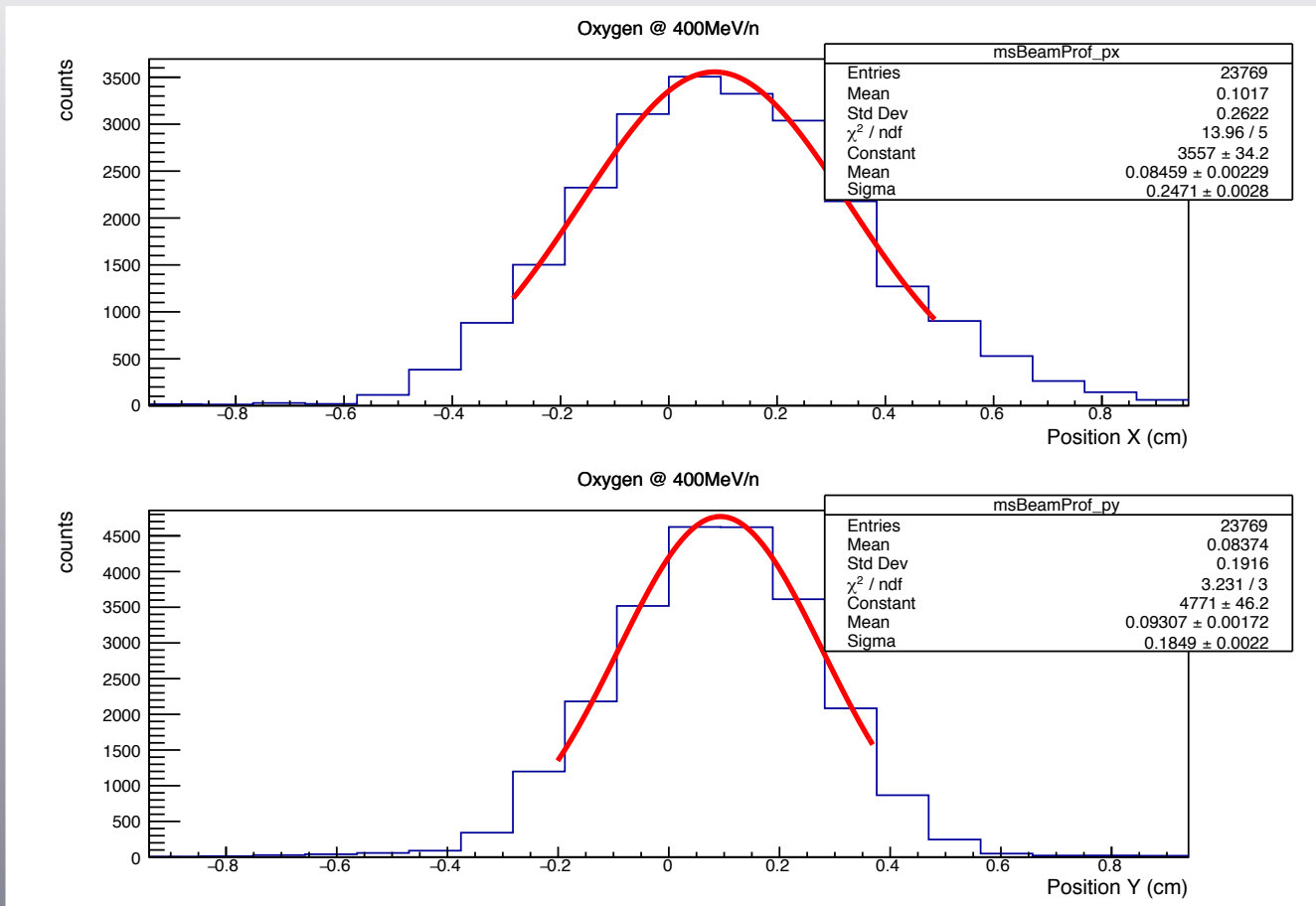
VTX Beam Profile



- MeanX = 0.847 mm SigmaX = 2.22 mm
- MeanY = 0.927 mm SigmaY = 1.48 mm
 - ➡ $\Delta\text{MeanX} = 59 \mu\text{m}$
 - ➡ $\Delta\text{MeanX} = 46 \mu\text{m}$

Oxygen w/o target (vii)

Beam Profile

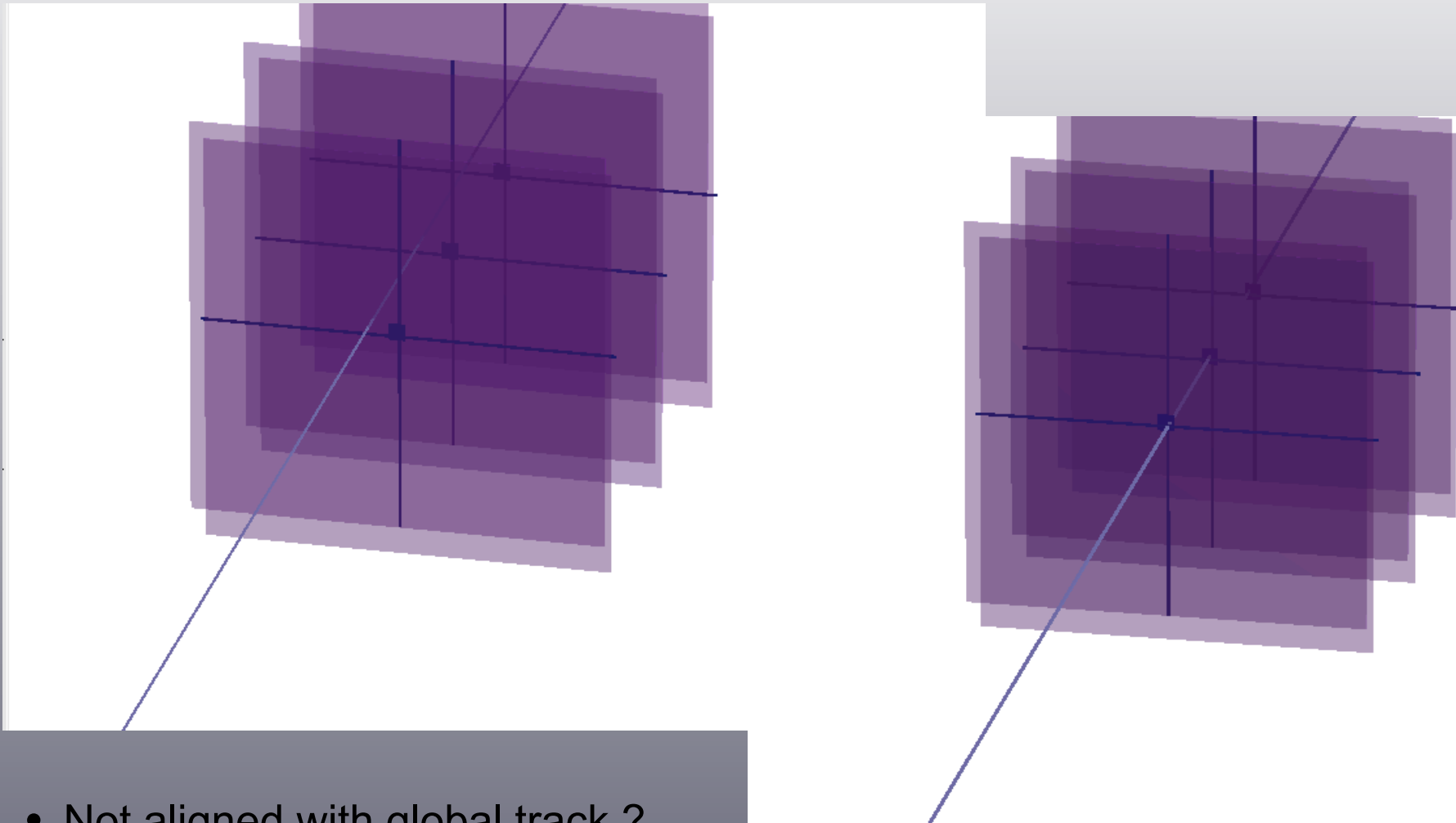


- MeanX = 0.846 mm SigmaX = 2.22 mm
- MeanY = 0.931 mm SigmaY = 1.48 mm
 - ➡ $\Delta\text{MeanX} = 1 \mu\text{m}$
 - ➡ $\Delta\text{MeanX} = 3 \mu\text{m}$

➡ Re-Aligned with VTX

Global tracking (i)

• Global display with MSD:



- Not aligned with global track ?
- Need a displacement $\sim 8\text{mm}$ in X ?

Global tracking (ii)

• Geometry file for MSD:

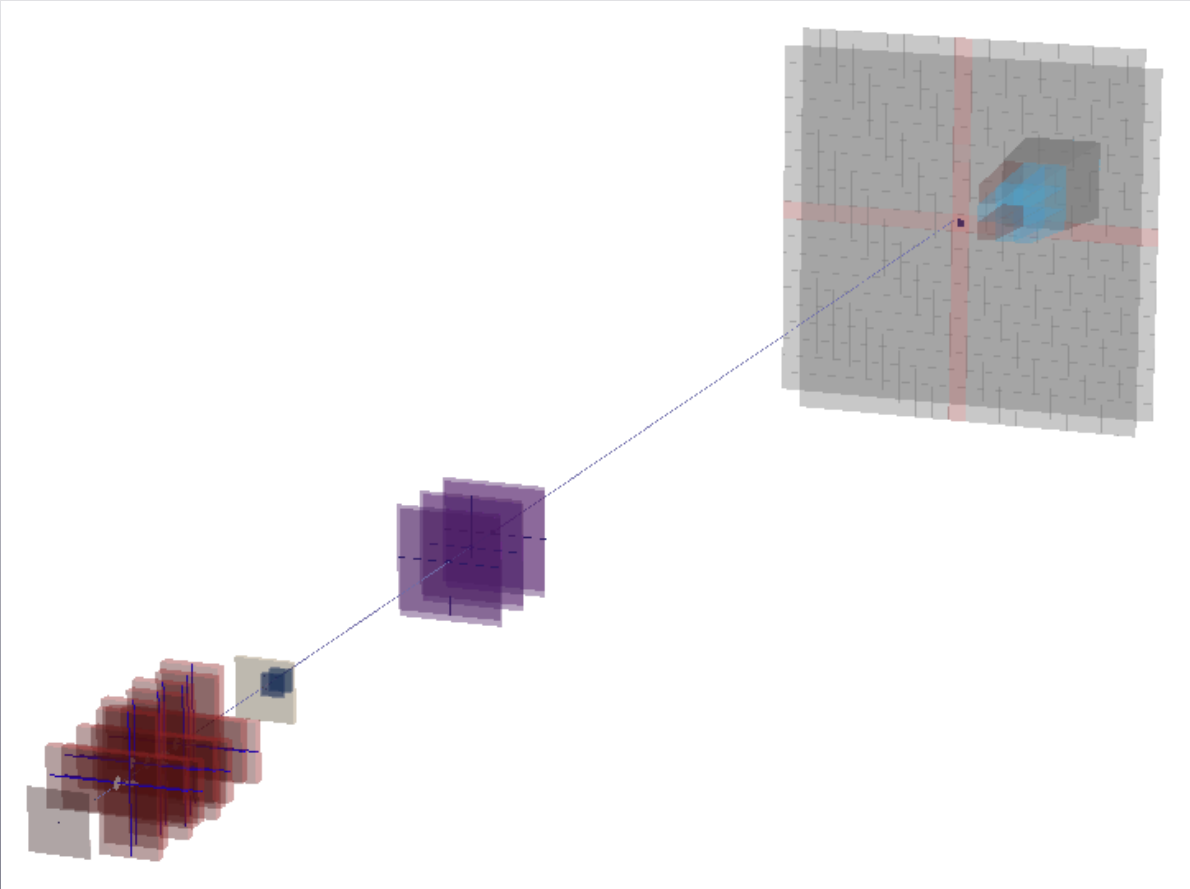
```
// -+-+-+-+-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
// -+-+-+-+-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
//
// Mapping file for FOOT Micro Strip Detector
//
// -+-+-+-+-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
// Parameters of the Sensors
// -+-+-+-+-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Sensors:                6

// MSD
TypeName:               "MSD"
TypeNumber:            1
StripN:                640
Pitch:                 0.0150
TotalSizeX:          9.815   TotalSizeY:    9.815   TotalSizeZ:    0.0200
EpiSizeX:           9.600   EpiSizeY:    9.390   EpiSizeZ:     0.0150
EpiOffsetX:        0.1075   EpiOffsetY:  0.2125   EpiOffsetZ:   0.0000
```

- Should re-check these values in geometry file

Global tracking (iii)

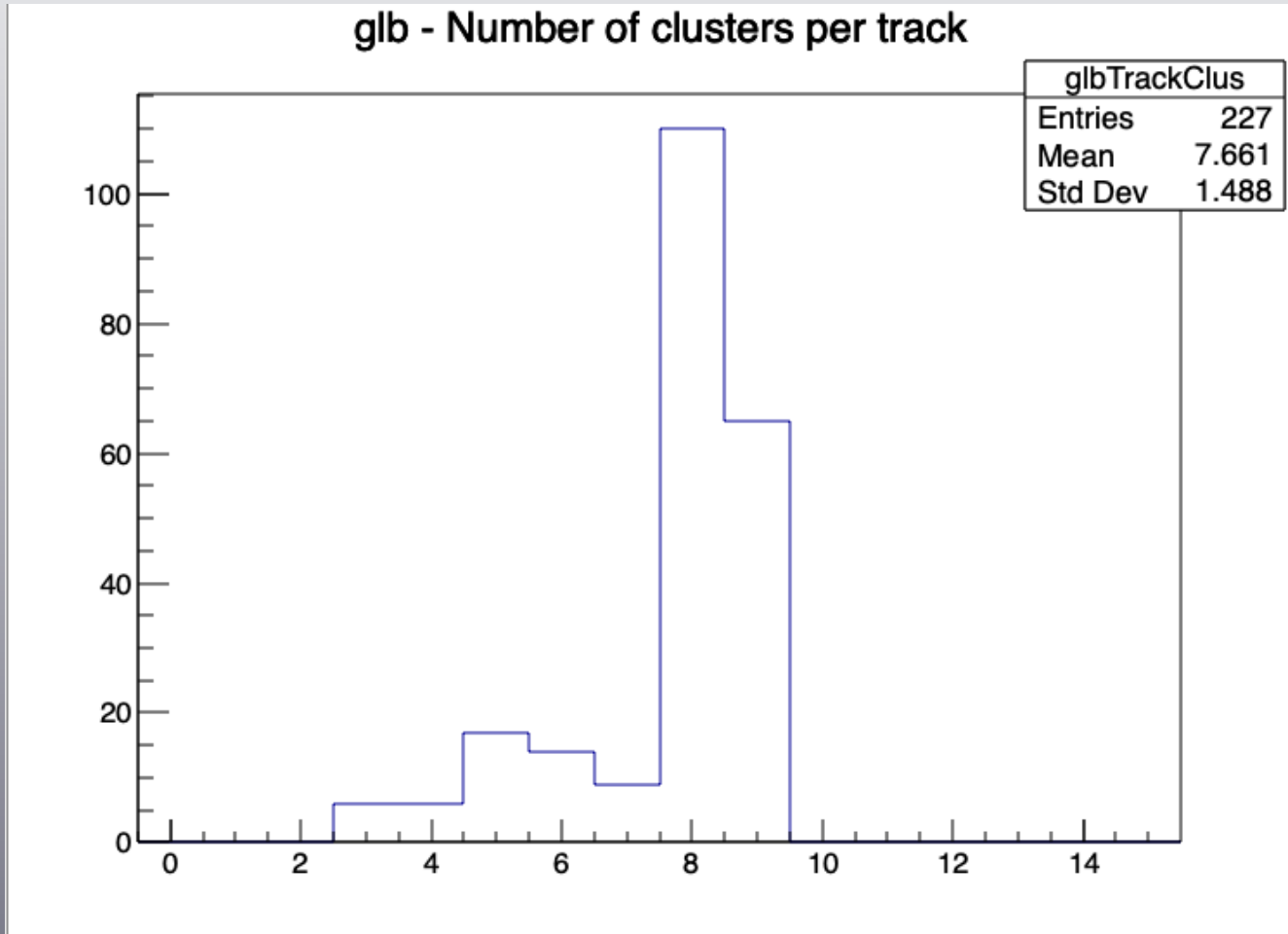
• Global display:



- Seems not be completely misaligned

Global tracking (iv)

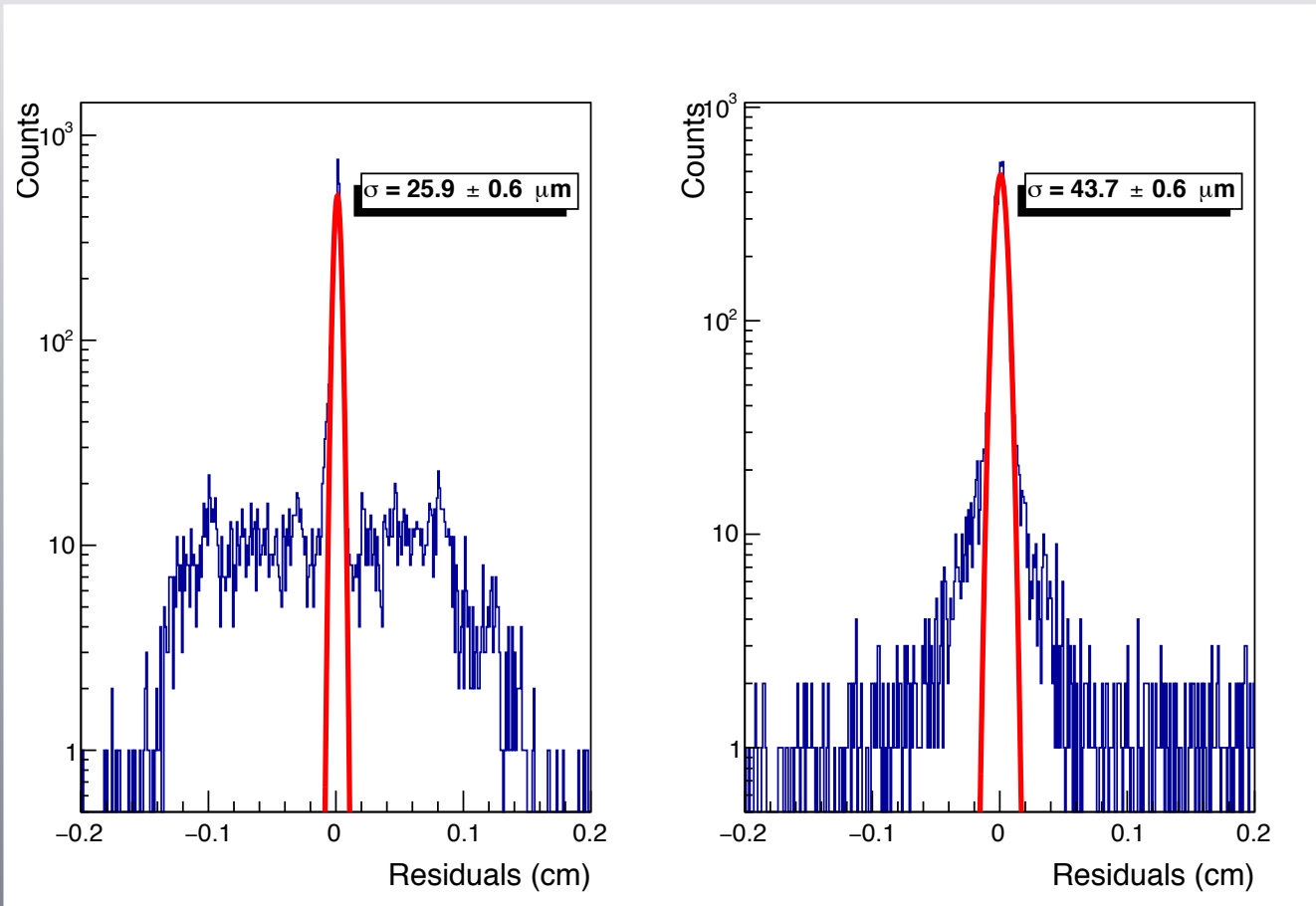
• Clusters per track:



- Mostly 8 clusters per track (4 VTX + 3 MSD + 1 TW)

Global tracking (v)

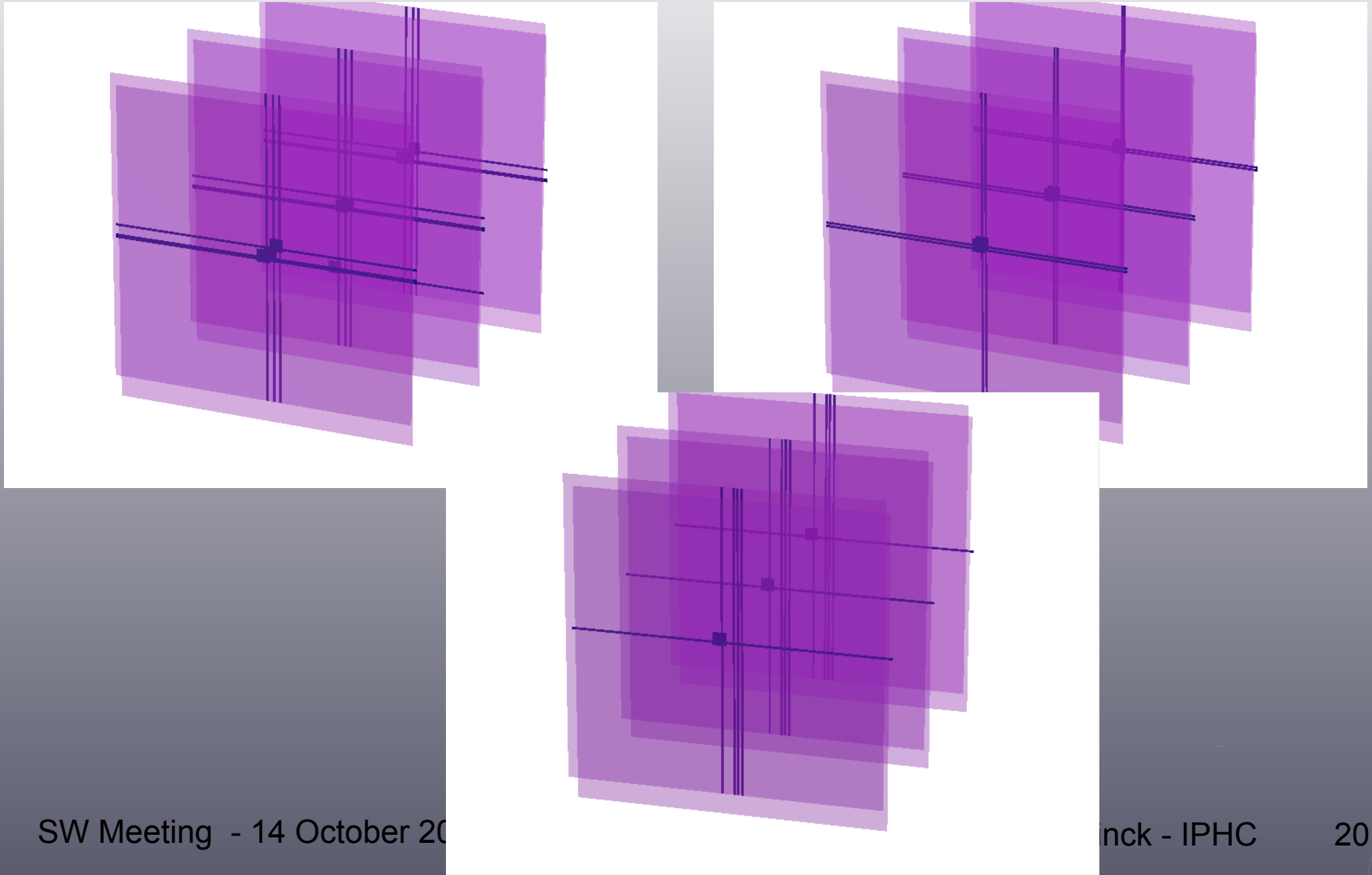
• Total residuals:



- Still pb with X
- Could be improved in Y

Event display (ii)

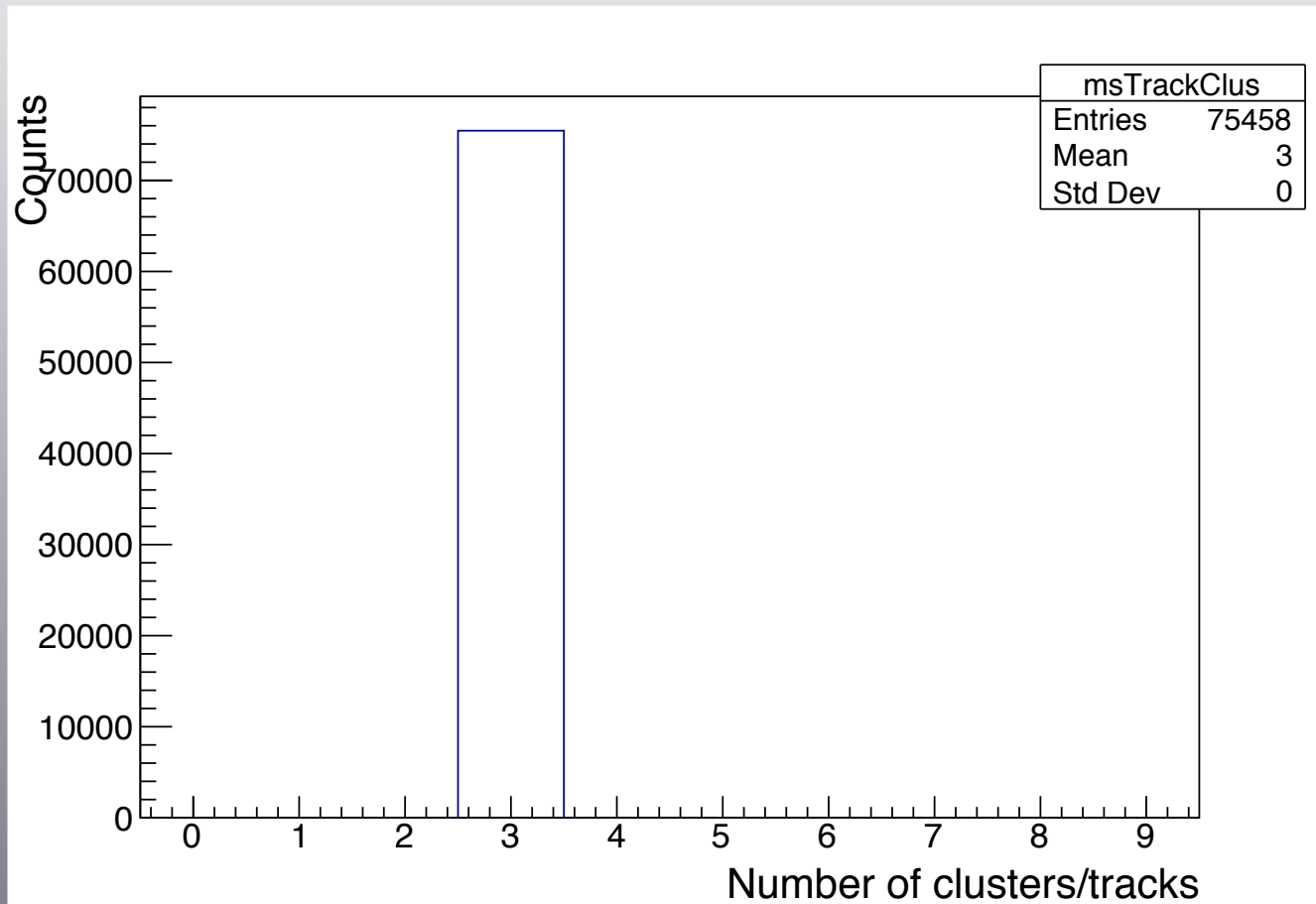
• Crazy events:



Run 4303

Oxygen with target (ii)

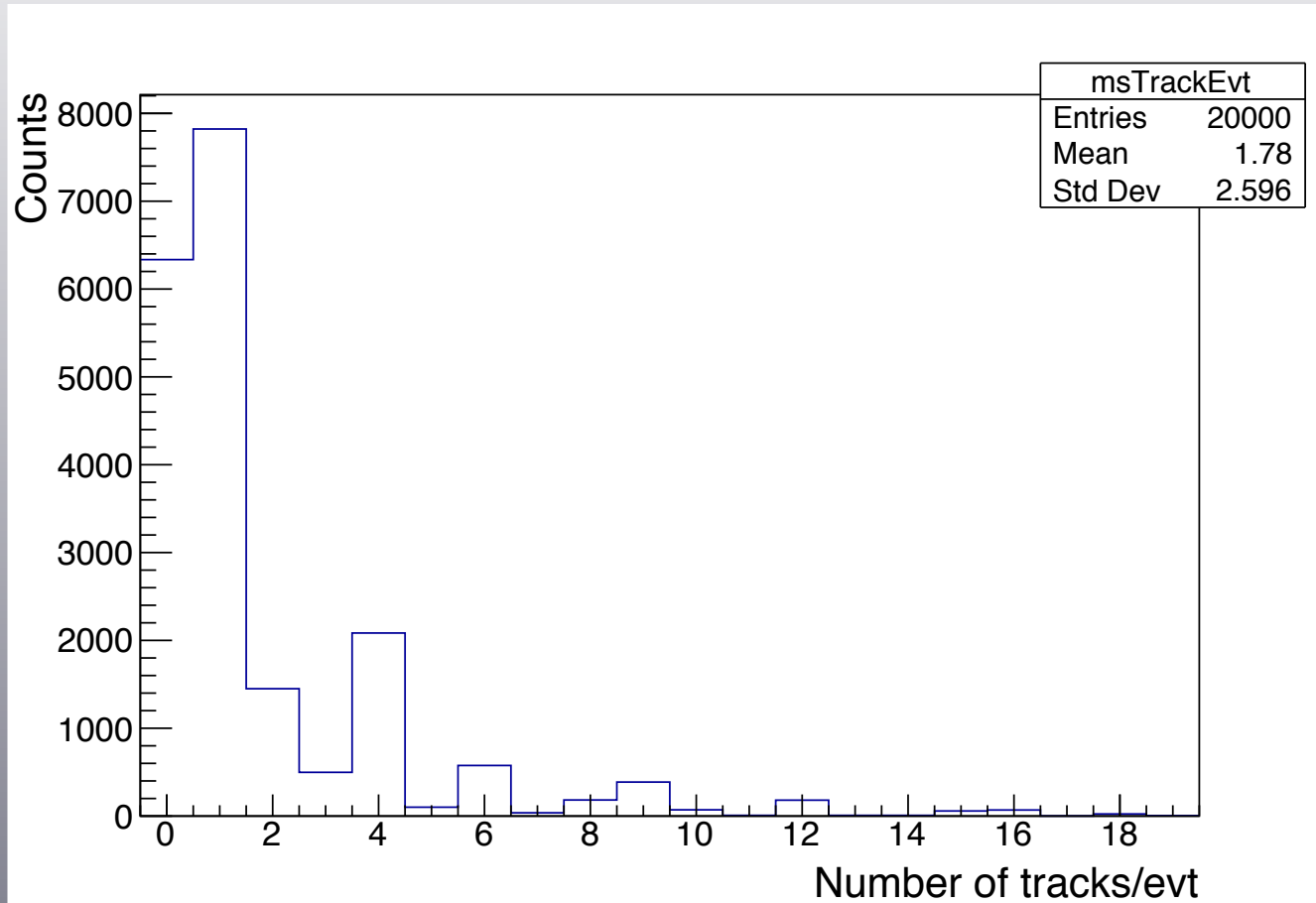
• Clusters per track:



- Ask for 3 stations

Oxygen with target (i)

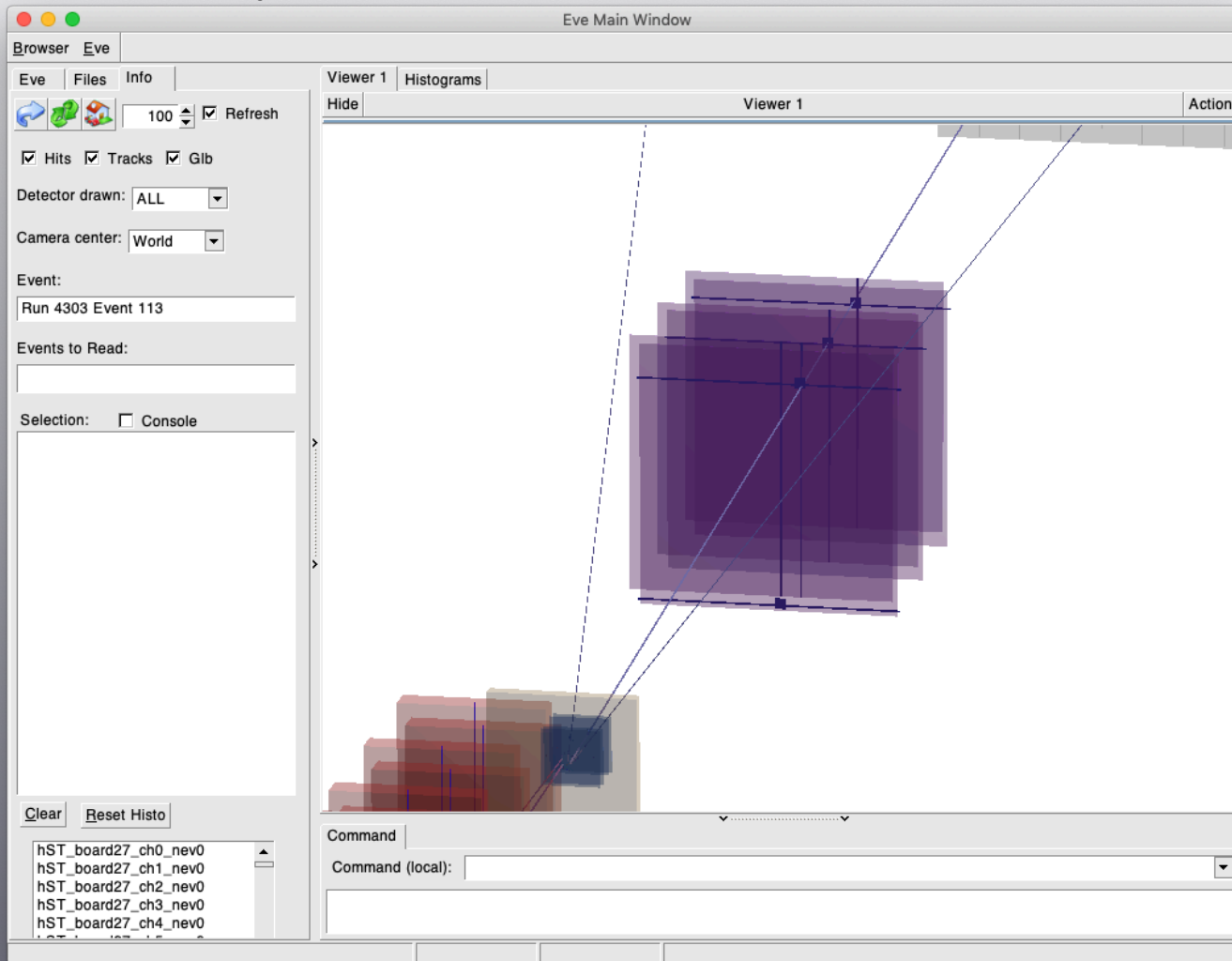
• Tracks per events:



- Tracks presence in 67.9% of cases,
- Important proportion of multi-tracks (42.3%)
- ➡ Seems to show a pattern

Global tracking

• Global display:



- Fragmented event

Conclusions

- MSD planes aligned
- Alignment with VTX (shift in X of 8 mm ?)
- Still some open questions
 - ➔ pb with geometry/mapping/clustering/noise ?
 - ➔ sigma noise set to 40 ?