

Alignment

Framework

GSI: VTX

MC: VTX(+MSD)

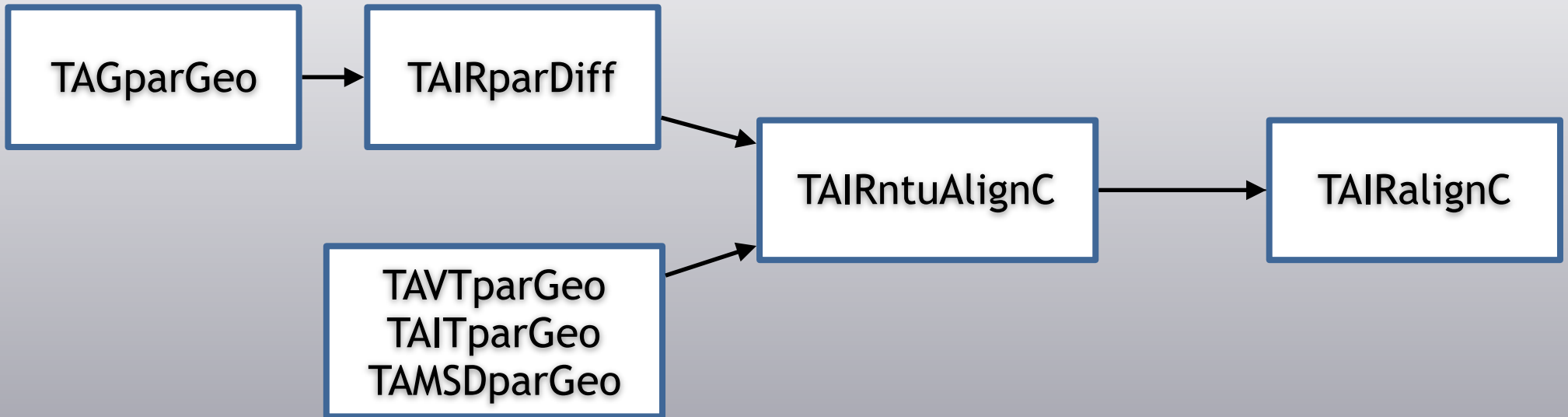
IT Alignment

Conclusion

Ongoing

Framework

TAIRbase:



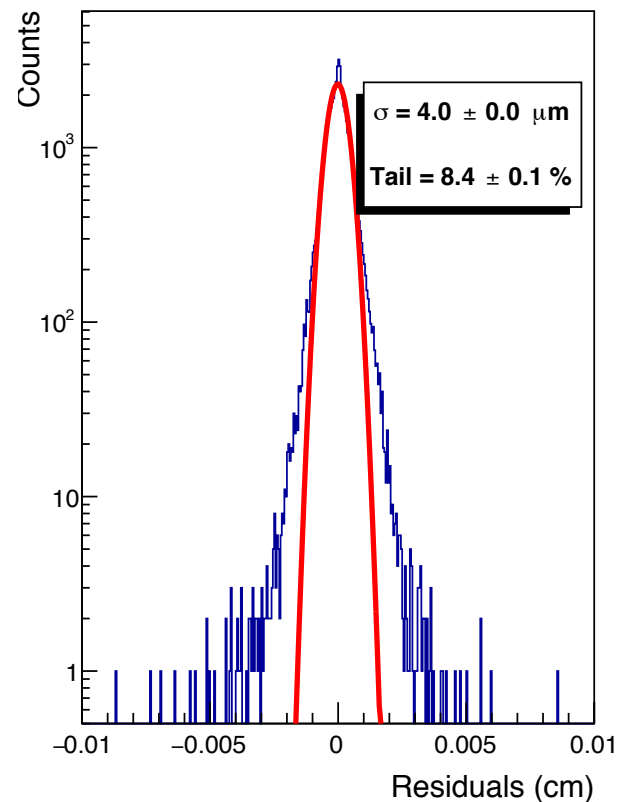
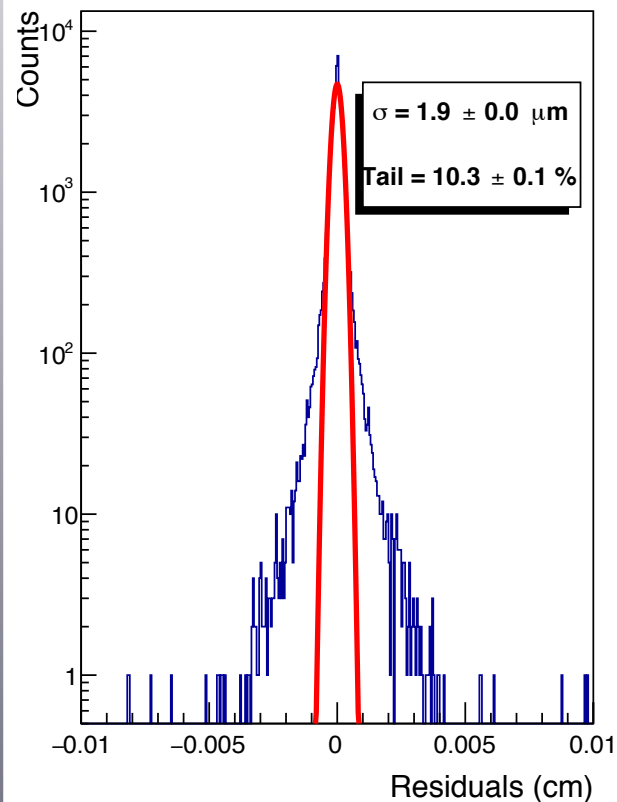
- TAGparGeo contains information of beam and target
- TAIRparDiff contains scattering processes computing

➔ Method published in C.-A. Reidel, Ch. Finck et al, N.I.M. A 931 (2019)
(Compute from cluster positions)

GSI: Vertex

Alignment:

- Dedicated run w/o target



➔ Successfully aligned

MC: VTX

• Mis-alignment: $\Delta Y[1] = 100 \mu\text{m}$, $\Delta\Phi = 0.5^\circ$, ^{12}C beam at 400 MeV

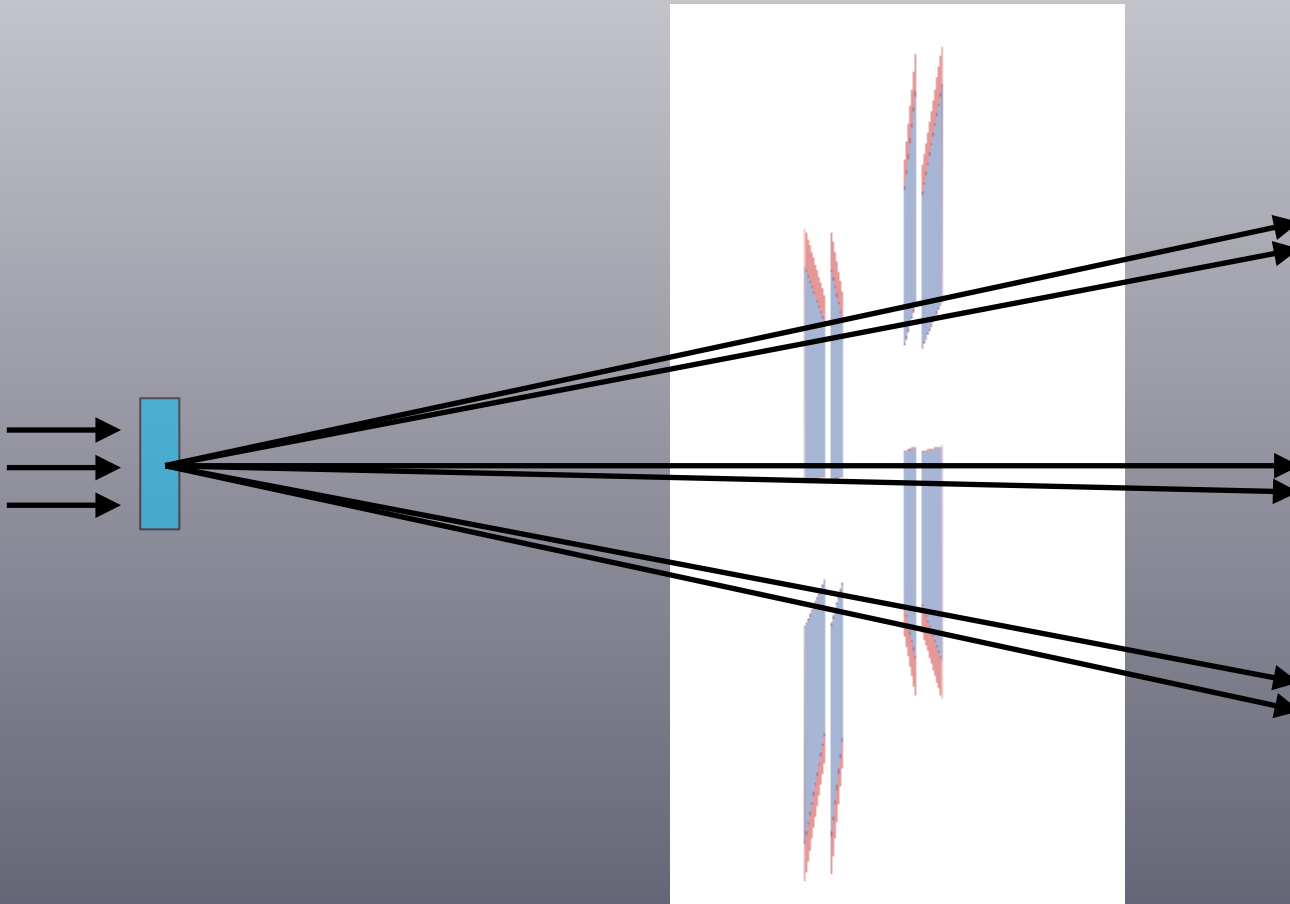
```
Number of events: 10000
Loaded Event:: 0
Sensor: 1 OffsetU: 0.0 OffsetV: 0.0 TiltW: 0.000
Sensor: 2 OffsetU: 0.7 OffsetV: 100.0 TiltW: 0.407
Sensor: 3 OffsetU: 0.5 OffsetV: 0.1 TiltW: -0.373
Sensor: 4 OffsetU: 0.0 OffsetV: 0.0 TiltW: -0.470
Number of events for iteration 1: 9947 / 10000
-----
----- Alignment RESULT -----
-----
Sensor: 1 AlignmentU: 0.0 AlignmentV: 0.0 TiltW: 0.000 status 1
Sensor: 2 AlignmentU: 0.5 AlignmentV: 100.0 TiltW: 0.496 status 1
Sensor: 3 AlignmentU: 0.5 AlignmentV: 0.2 TiltW: -0.029 status 1
Sensor: 4 AlignmentU: 0.0 AlignmentV: 0.0 TiltW: -0.037 status 1
```

- Criteria convergence: $\Delta X = \Delta Y < 5 \mu\text{m}$ and $\Delta\Phi < 0.1^\circ$
 - ➔ Should work also when including MSD, cannot test, missing 2D-clusters

IT Alignment (i)

• Strategy (discussion with Eleuterio)

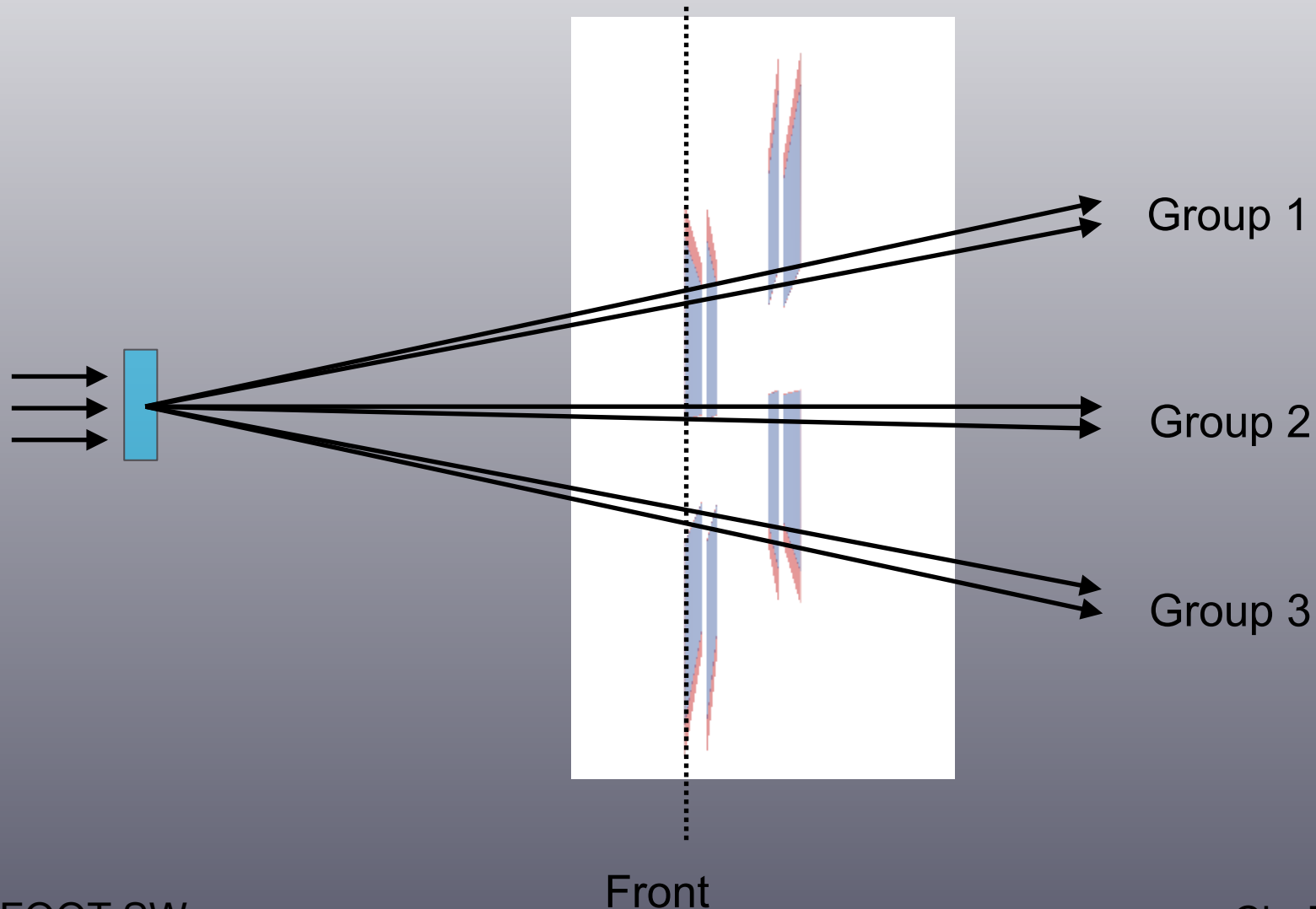
1. Have removable dipoles !
2. Using a thick target to generate tilted tracks



IT Alignment (ii)

• Software strategy (discussion with Claire-Anne) (i):

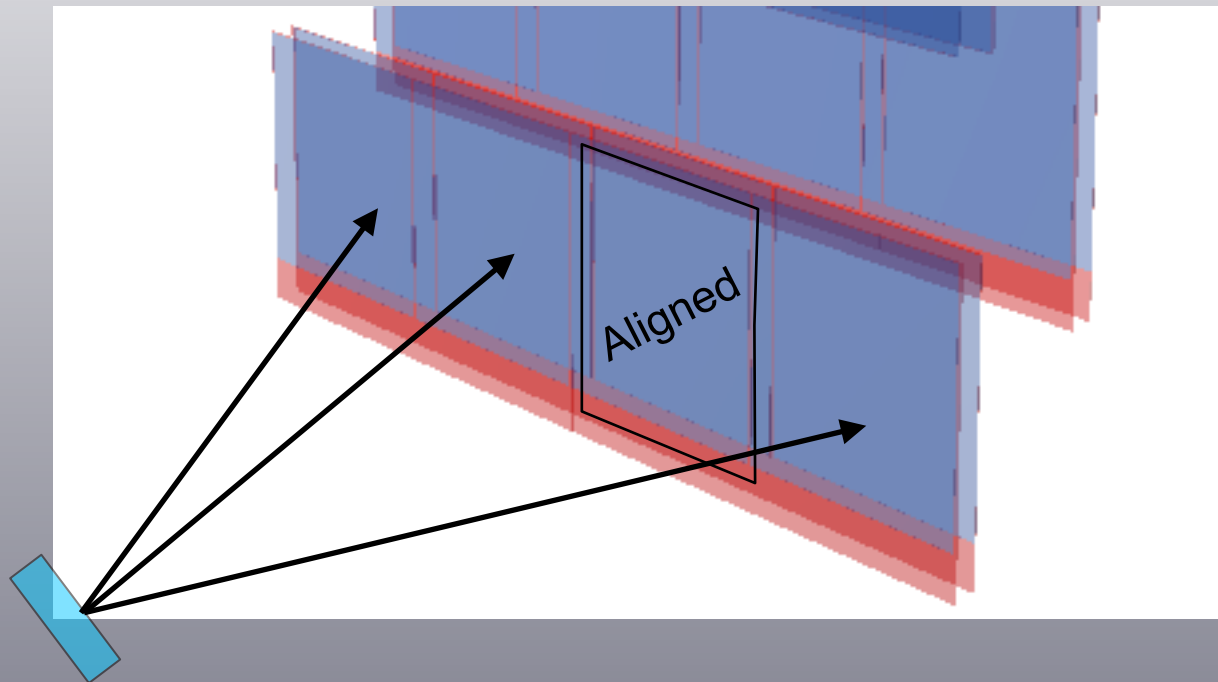
1. Alignment by groups in overlapping regions, only one sensor in front considered



IT Alignment (iii)

• Software strategy (discussion with Claire-Anne) (ii):

2. Align the three others with respect to the rear sensors



3. Align IT respect to VTX+MSD with no target

➔ Need code modification for sensor alignment in same plume

Conclusion

- Alignment works for VTX, tested with GSI and MC data
 - Alignment works in principle for MSD but need 2D-Cluster/tracks reconstruction
 - Strategy made for IT, but relatively complexe !
- ➡ Need some coding and tests:
- Revive the road tracking in IT (TAITactNtuTrack with vertex position as argument)

Ongoing

- Try with Millepede package: new classes in FOOT
 - TAIRmillepede: computing alignment
 - TAIRalignM: interface with millepede
 - ➔ Needs tracking: new TAIRactNtuTrack class
- TAIRactNtuTrack: combining VT tracks with IT clusters (no magnetic field)
 - tests with MC simulations: it seems to work (use as input in TAIRalignM)

