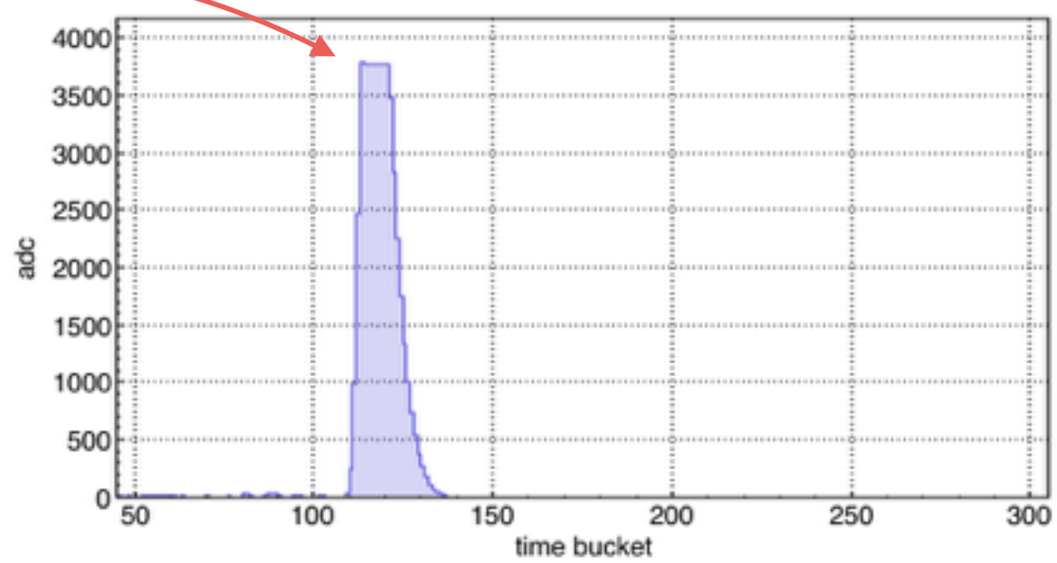
What we found – Software

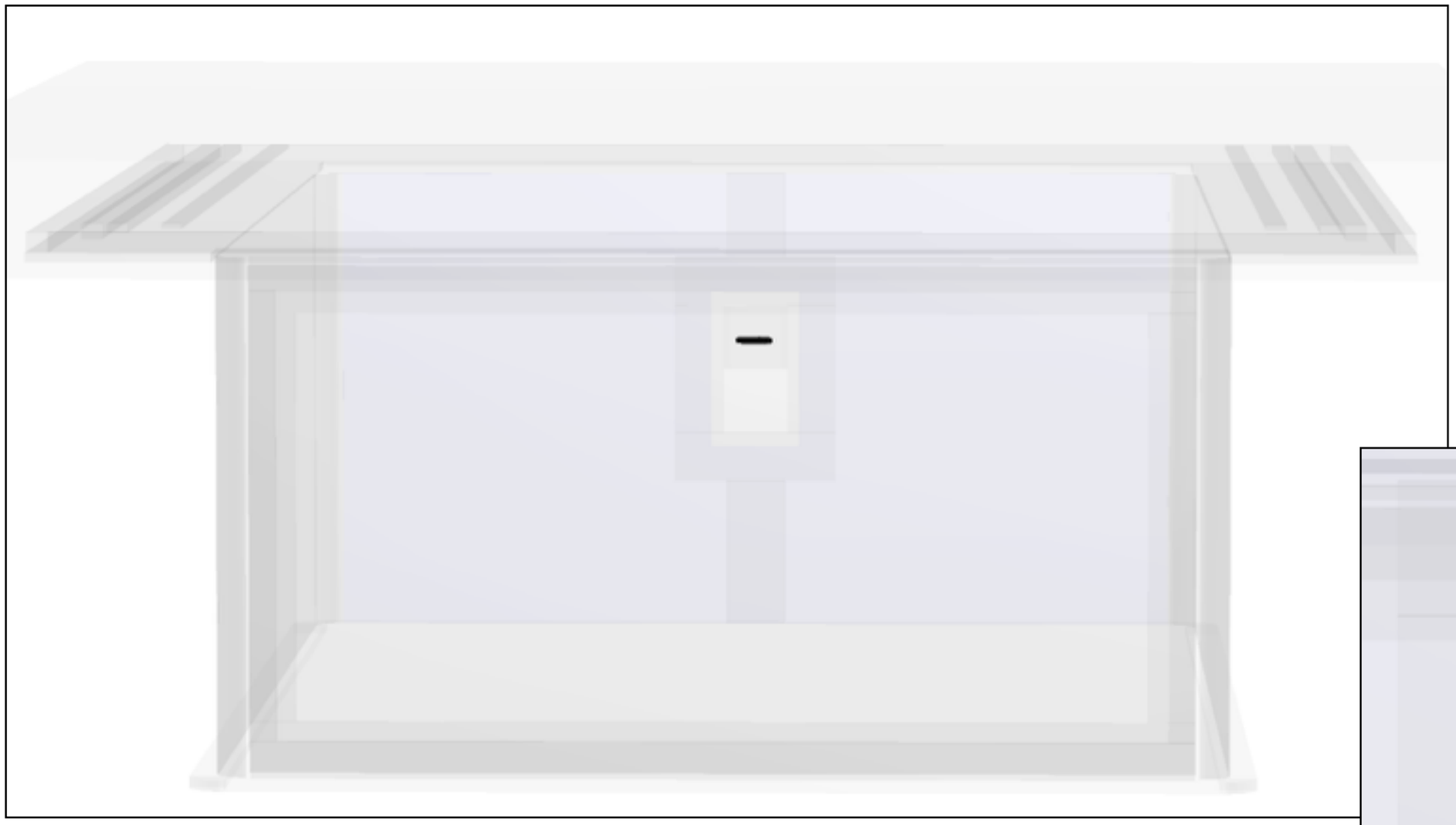
- **Pulse Shape Analysis (Problem!)**
  - ✓ Saturated data.
  - ✓ Too slow. (> 1 s/event)

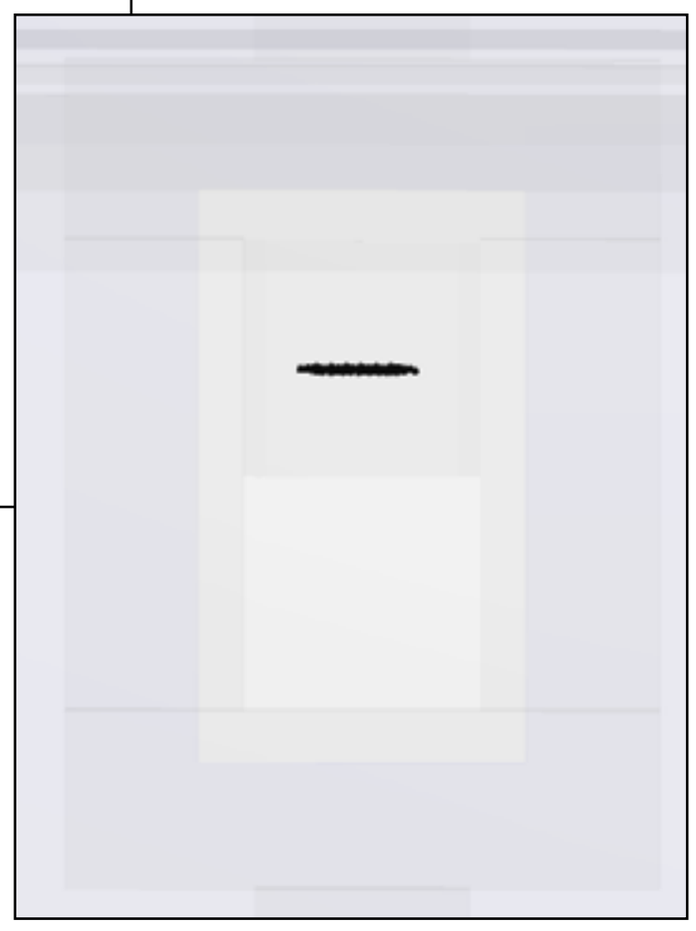


- **Linear Tracking**
  - ✓ New Task after PSA.
  - ✓ Count number of tracks and Find primary vertex.

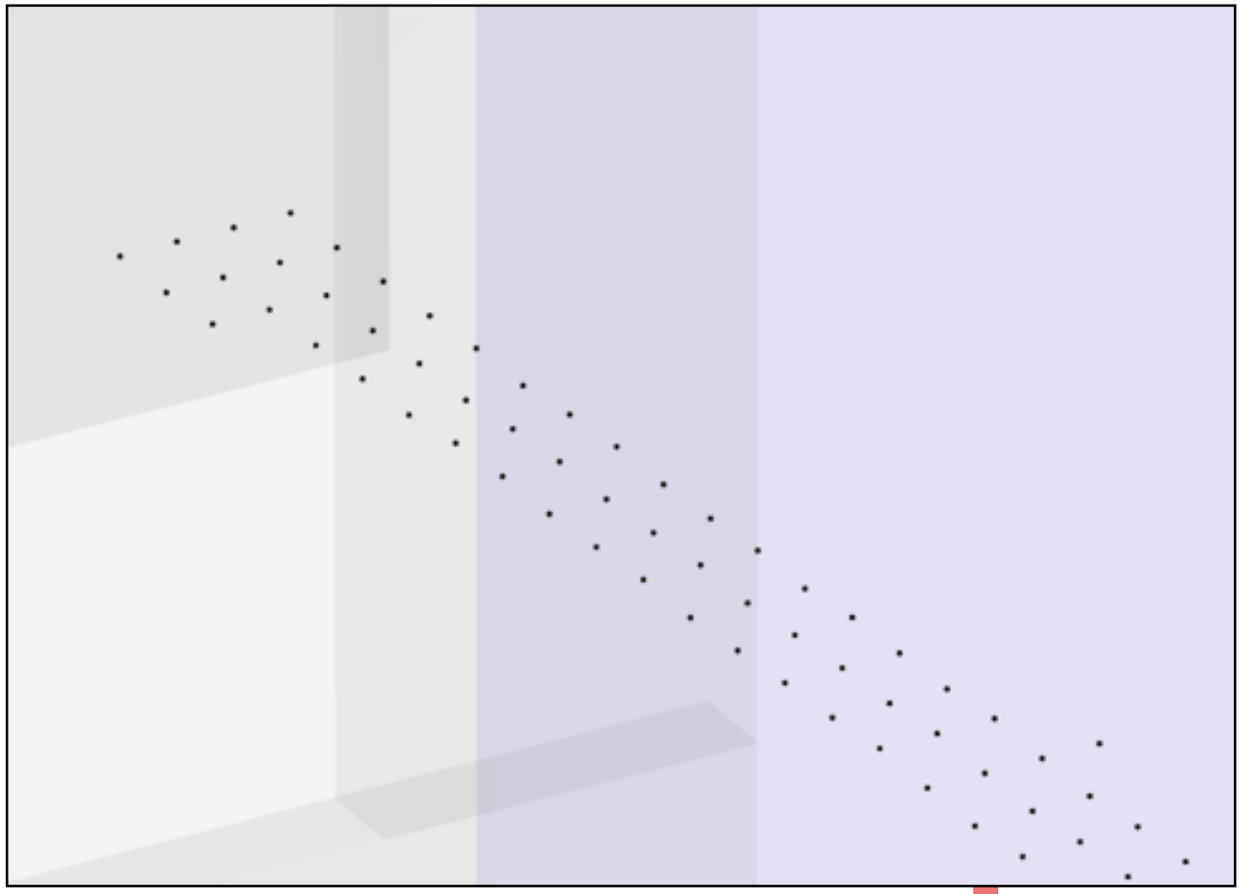
- **Clustering, Riemann Tracking, Genfit**
  - ✓ Not tested.

Basic concept of linear tracking



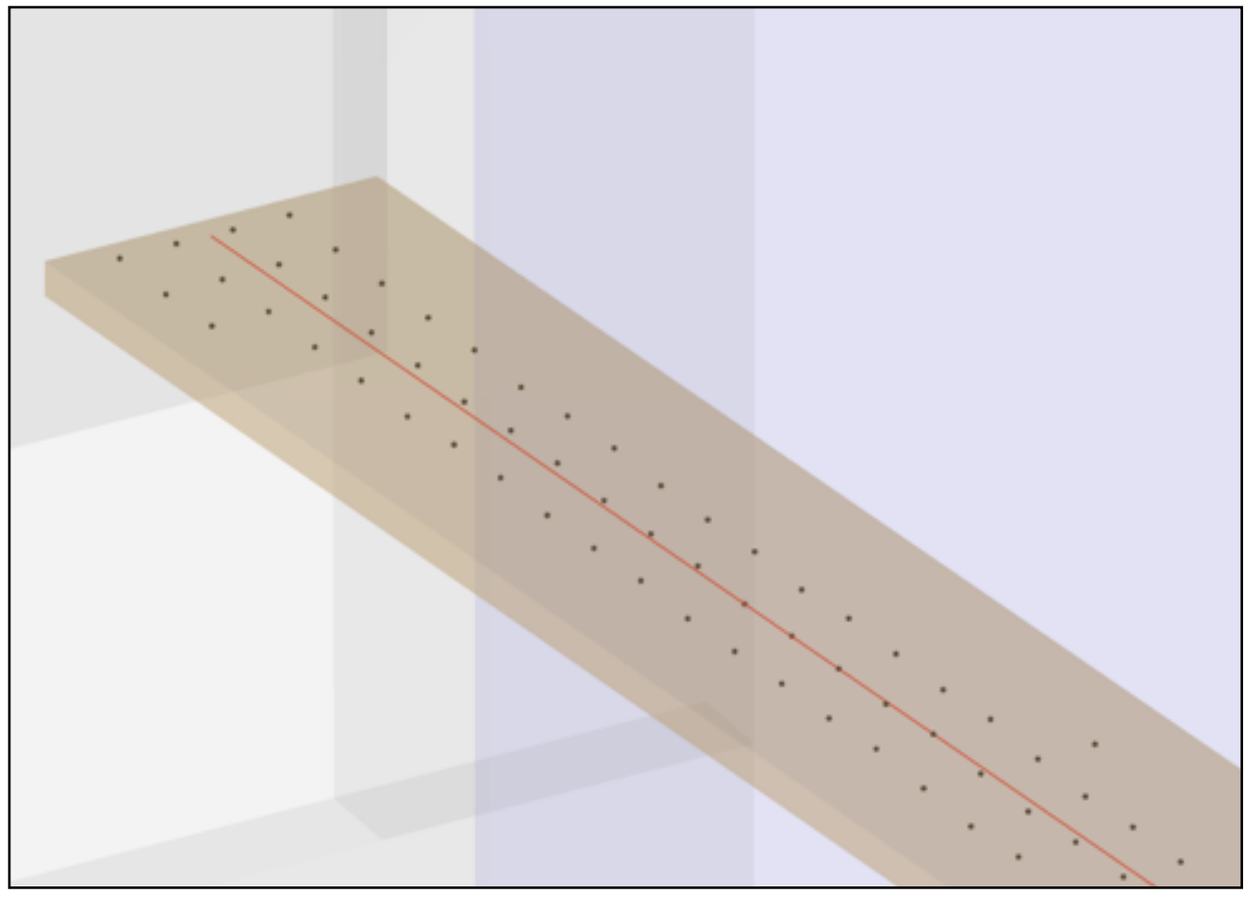


Because of the diffusion and pulse generation a track seen from certain angle stays in a line. This means track in 3D space forms a plane.

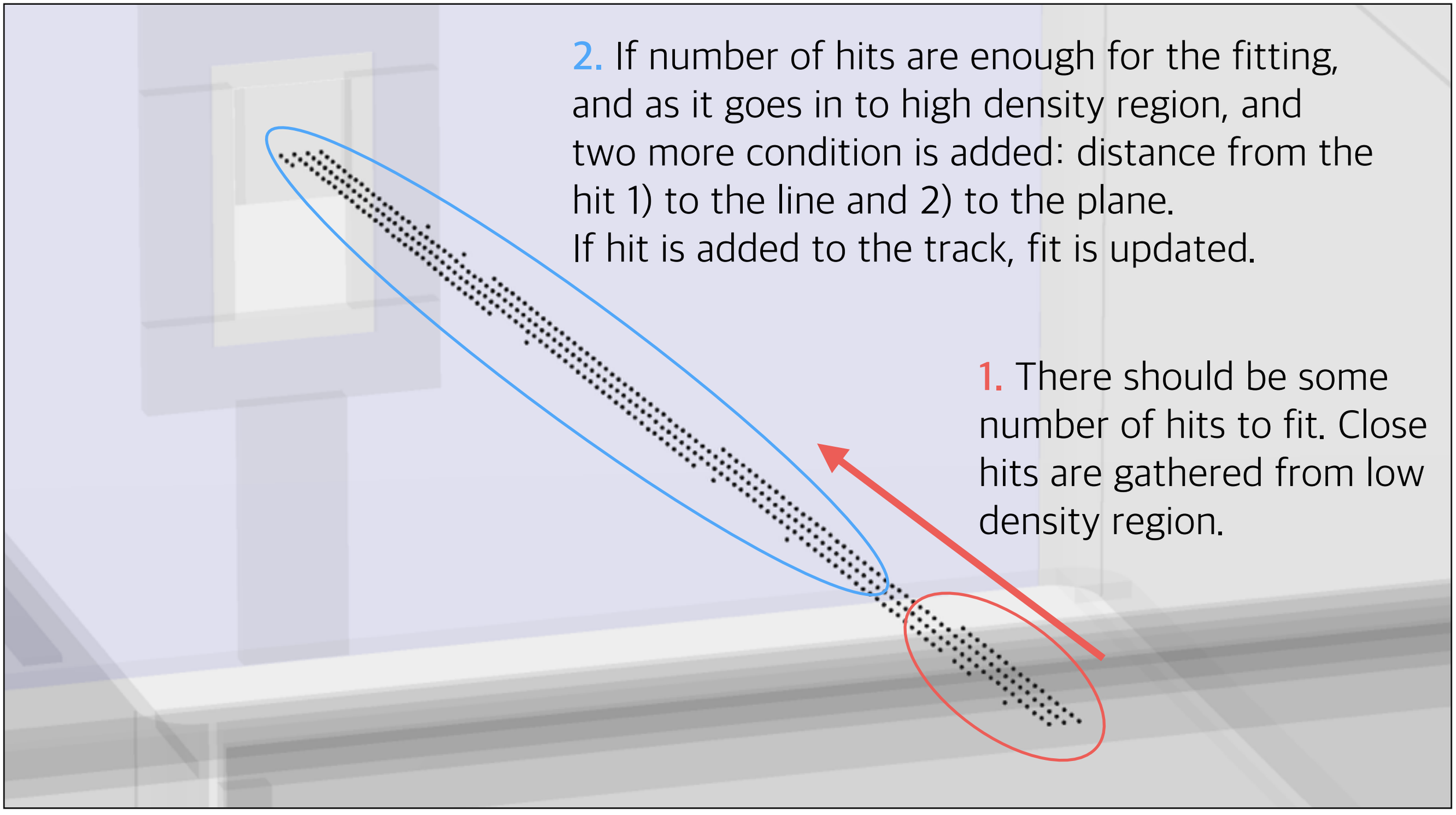


Hits created from track are fitted with orthogoanl distance regression method. This is just solving an eigen value equation. Note that it does not iteration when fitting and fitting a line and plane is actually the same job.

To distinguish two tracks close to each other, we can give a cut: distance from the hit 1) to the line and 2) to the plane.



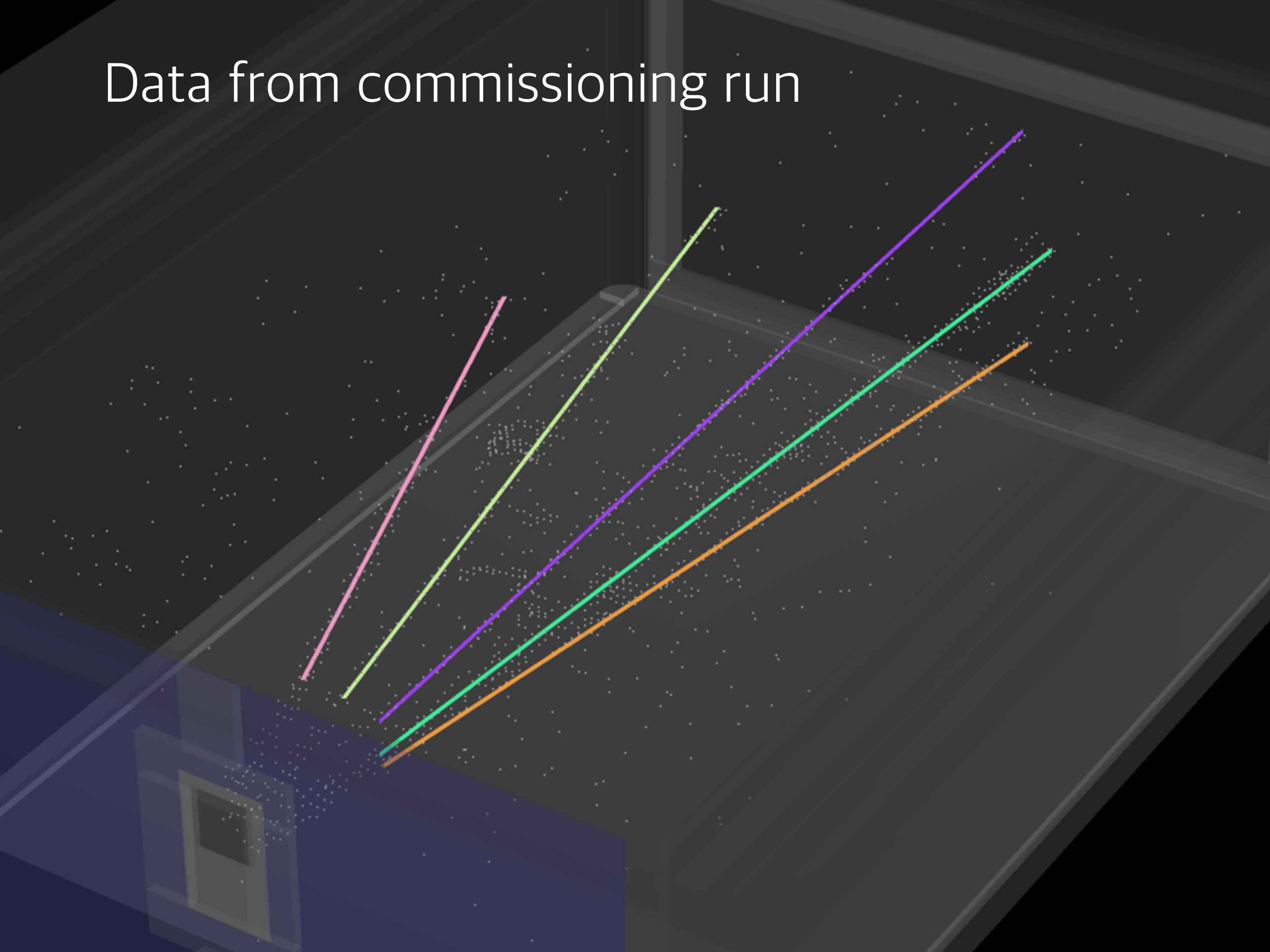
Steps



2. If number of hits are enough for the fitting, and as it goes in to high density region, and two more condition is added: distance from the hit 1) to the line and 2) to the plane.
If hit is added to the track, fit is updated.

1. There should be some number of hits to fit. Close hits are gathered from low density region.

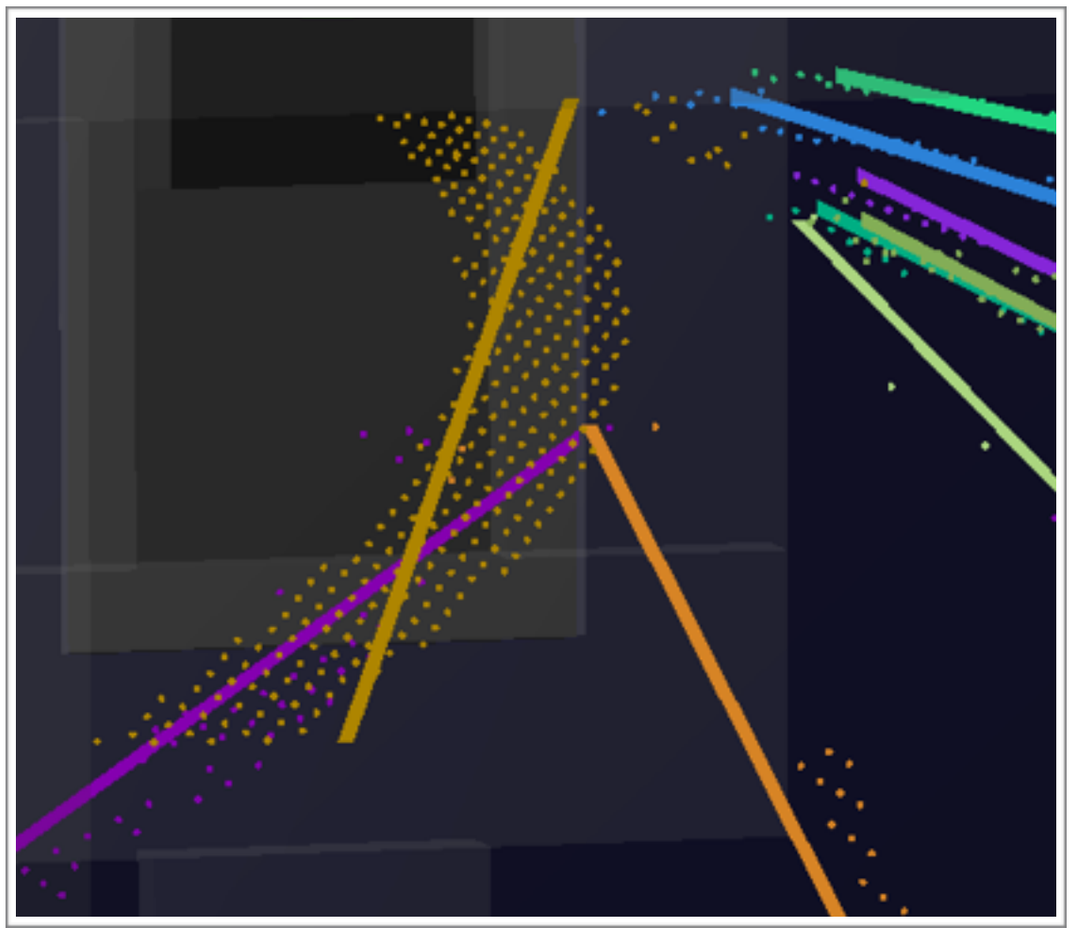
Data from commissioning run



Linear tracking task with simulation data

- Linear tracking task also finds curved track if RMS cut is large because helix track also forms plane before clustering.

- Hope for tracking helix!



Summary

- We found several problems of software (as well as hardware).
- Dead line is end of February to make the everything working.
- PSA is the most urgent problem in software.