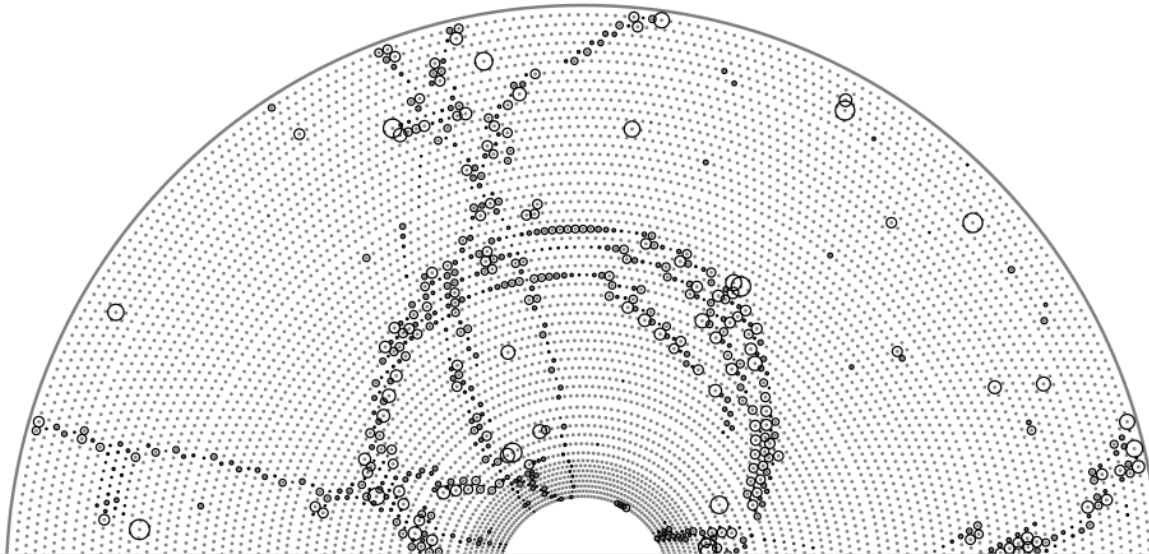# Tracking inefficiency

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Tracking inefficiency

- **Pattern recognition:**
  - Missing track
    - High-pt tracks with wide polar angle
  - Wrong hits
    - Wrong trajectories, etc
  - Tracks overlapping

  - "False positive" inefficiency
   - Specialty of the efficiency definition

- **Genfit:**
  - Missing hits
    - Missing superlayer
  - Wrong hits
  - Kink:
    - Decay

- It's hard to clearly categorize all sources
- Each case (of track loss) represents combination of different factors
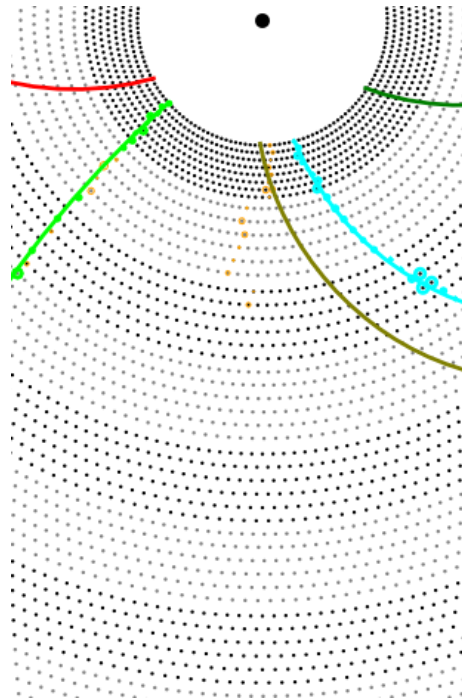
Reco path

- Standart reco path was used:
  - WireHitToplogyPreparer
  - SegmentFinderCDCFacetAutomatonDev
  - TrackFinderCDCLegendreTracking
  - TrackQualityAsserter
  - StereohitFinderCDCLegendreHistogramming
  - SegmentTrackCombinerDev
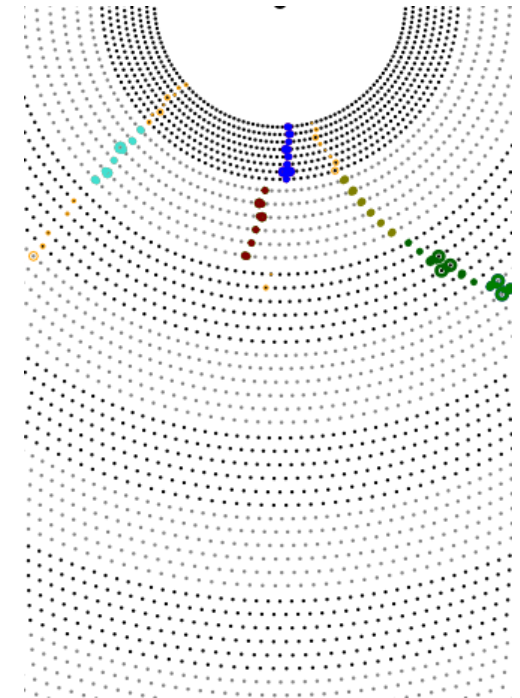 - TrackQualityAsserter
  - GenFit

Tracks with large polar angle (short in $\rho - \phi$ projection)
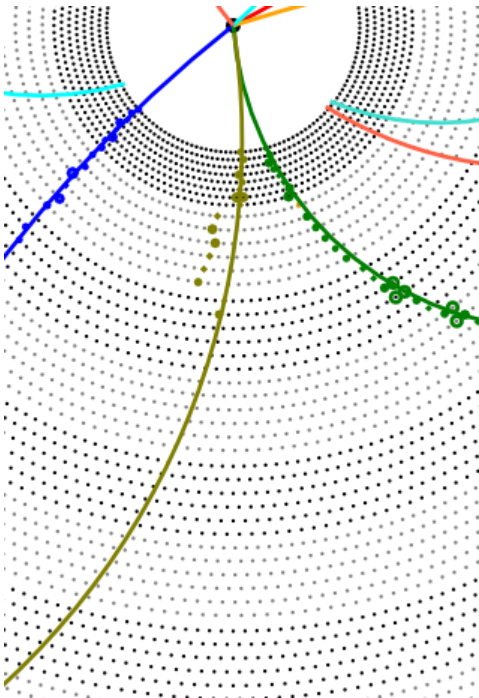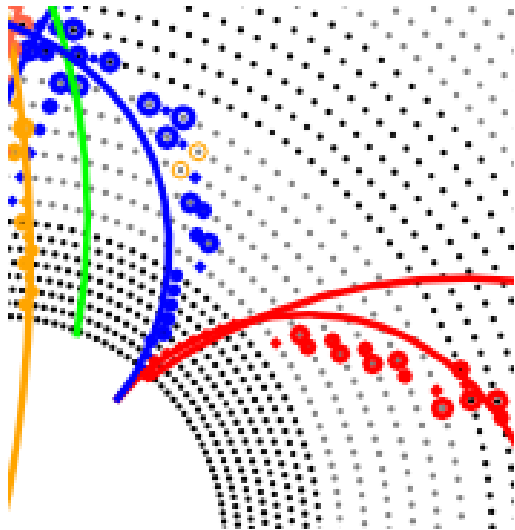

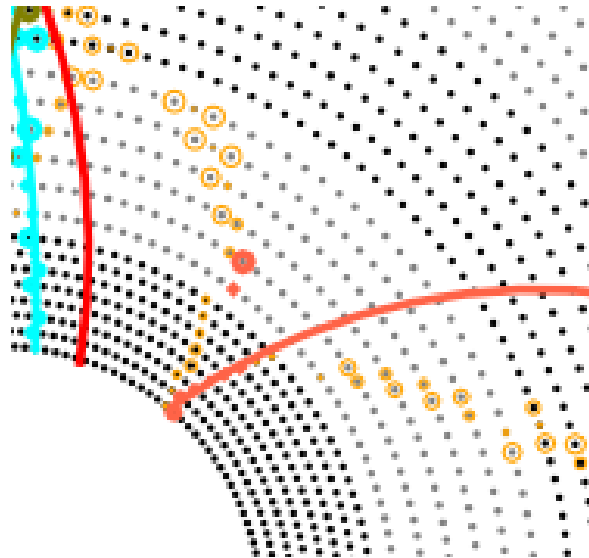MC finder

Pattern recognition

Segments

- Lack of hits
- Conformal transformation blows up drift circles in 1st SL
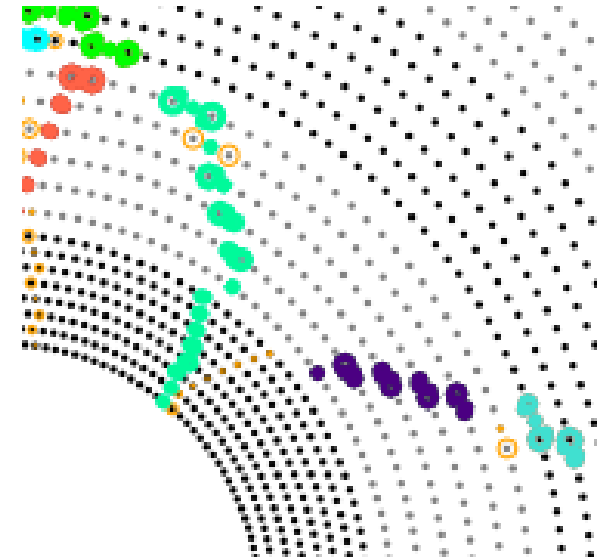 - As result intersection in Legendre phase space is smeared

Tracks with large polar angle (short in $\rho - \phi$ projection)
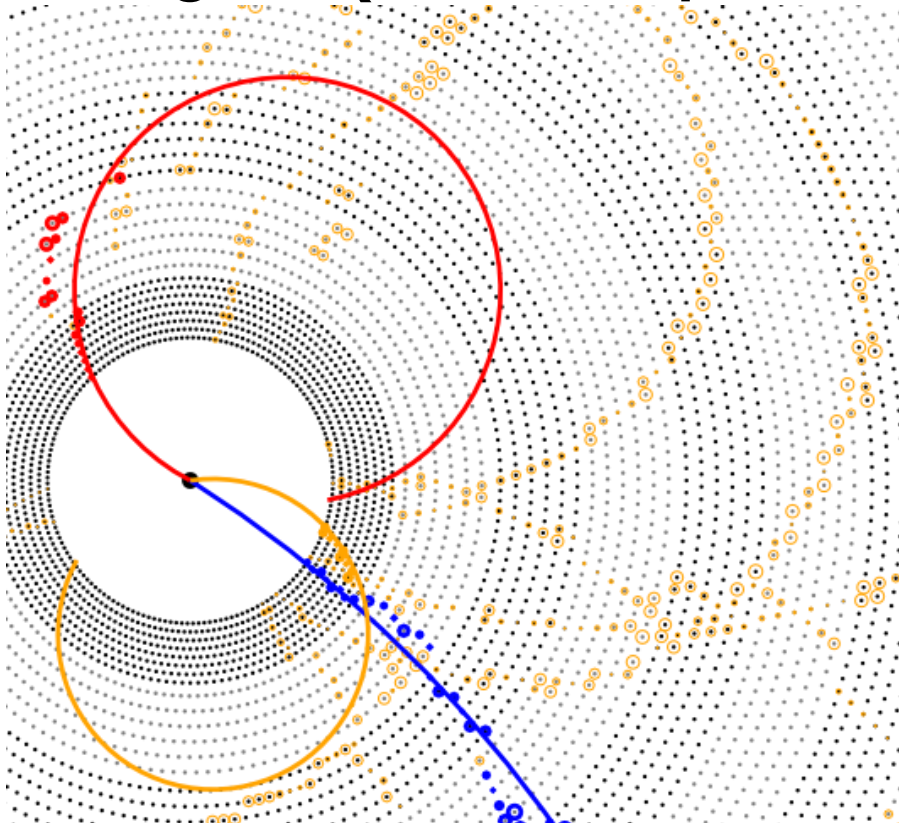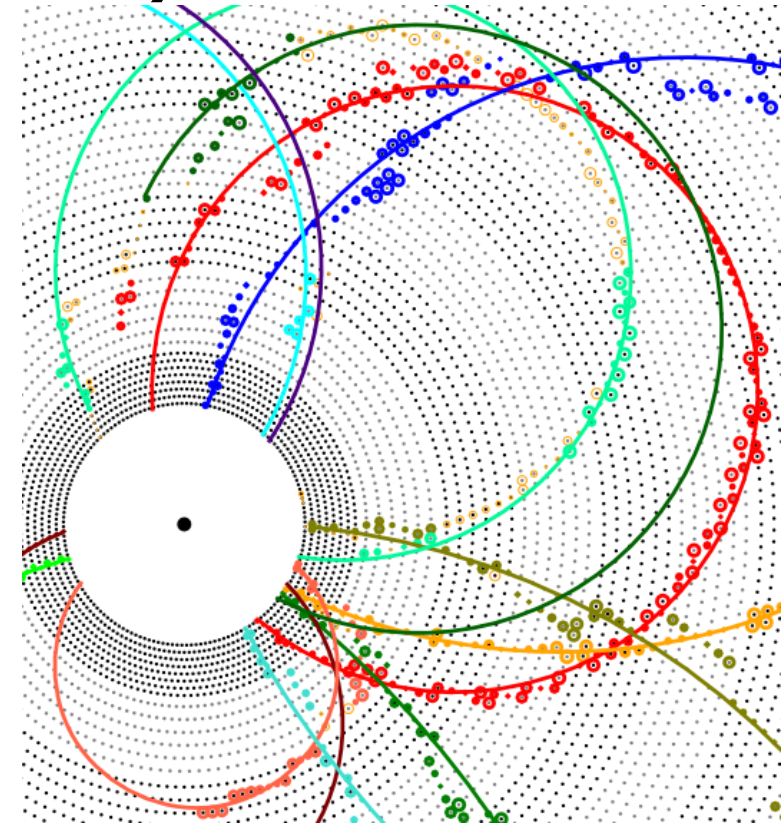

MC finder

Pattern recognition

Segments

- Tracks are coming not from IP
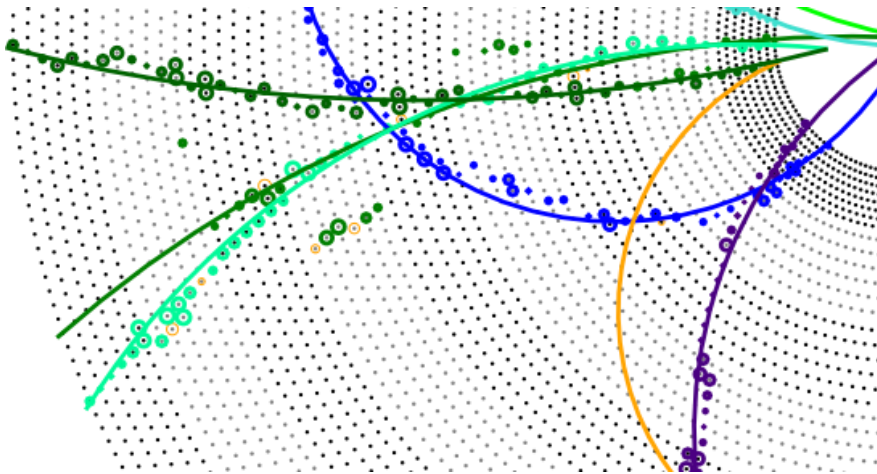
Wrong hits (and false positive case)
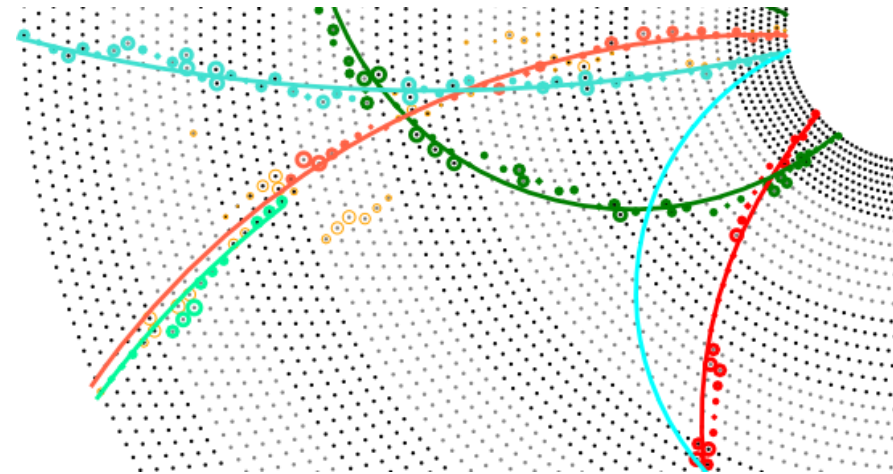

MC finder (missing tracks)

Pattern recognition

- Hits of the red track (MC finder) are assigned to another track
    - As result track is lost
- Blue track (MC finder) has corresponding PR track (green), but there is no relation in DataStore between them
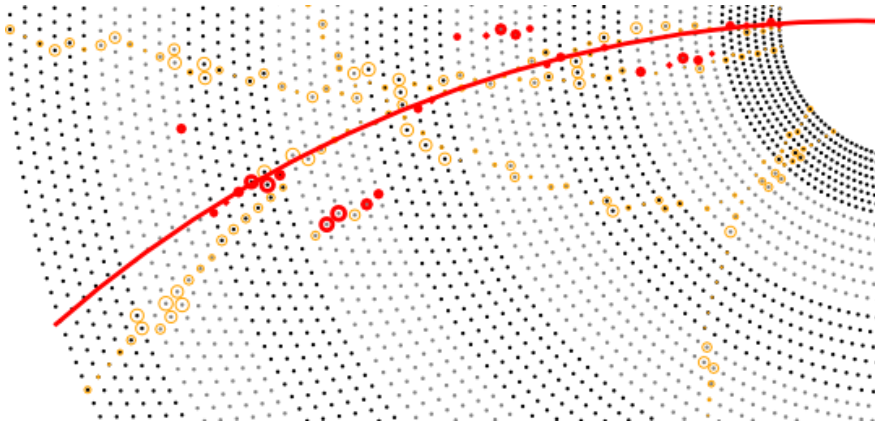
Tracks overlapping (wrong hits)
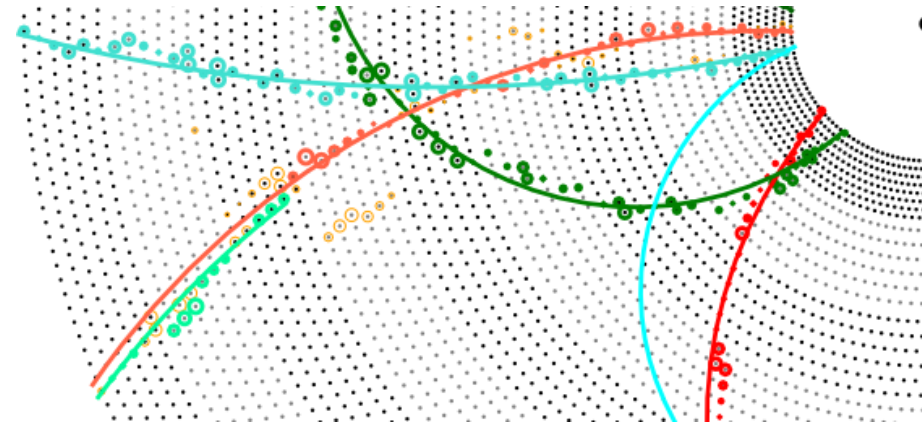

MC finder

Pattern recognition

- In case of track overlapping it could be tricky to make correct decision on hits assignment
  - Most problematic are stereohits
  - Possible solution – to introduce global optimization for stereohits assignment

Tracks overlapping (wrong hits)

MC finder
(missing tracks)

Pattern recognition

■ Stereohits of the red track assigned to wrong track and as result track is lost (from point of view of $MC \rightarrow PR$ relation)
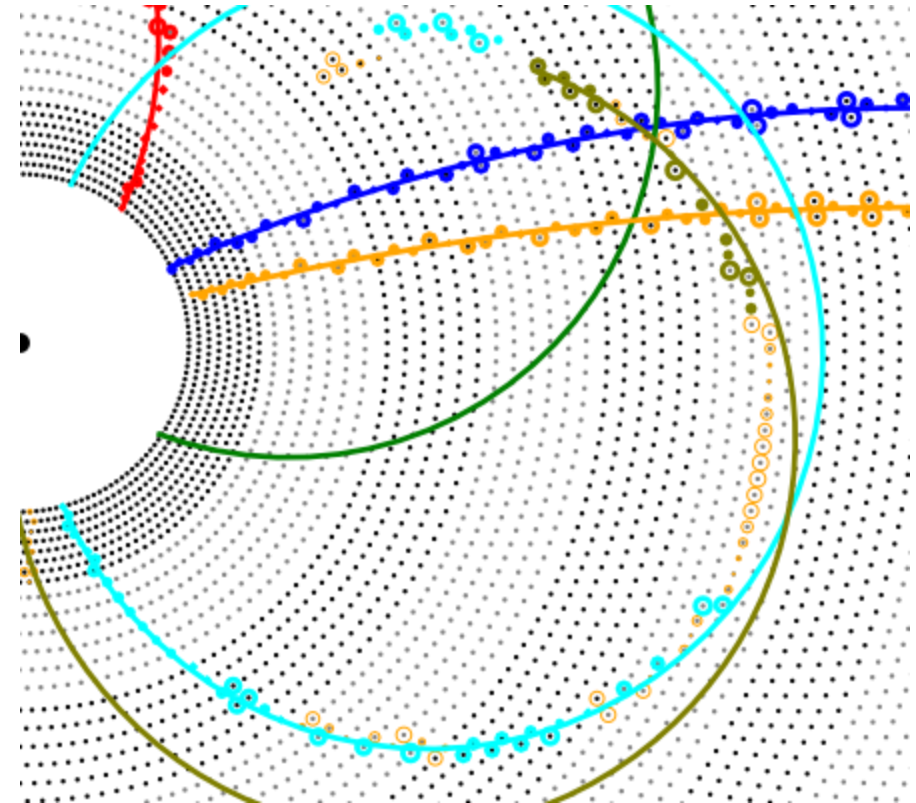
Conclusion

- Tracking inefficiency comes from special kinds of tracks as well as from specialty of the pattern recognition
  - Not circular
  - Short
  - Etc
- It's possible to recover some kind of tracks
  - Tracks with the kink
  - Short tracks

- False positive cases need further investigation

Thank you for your attention!
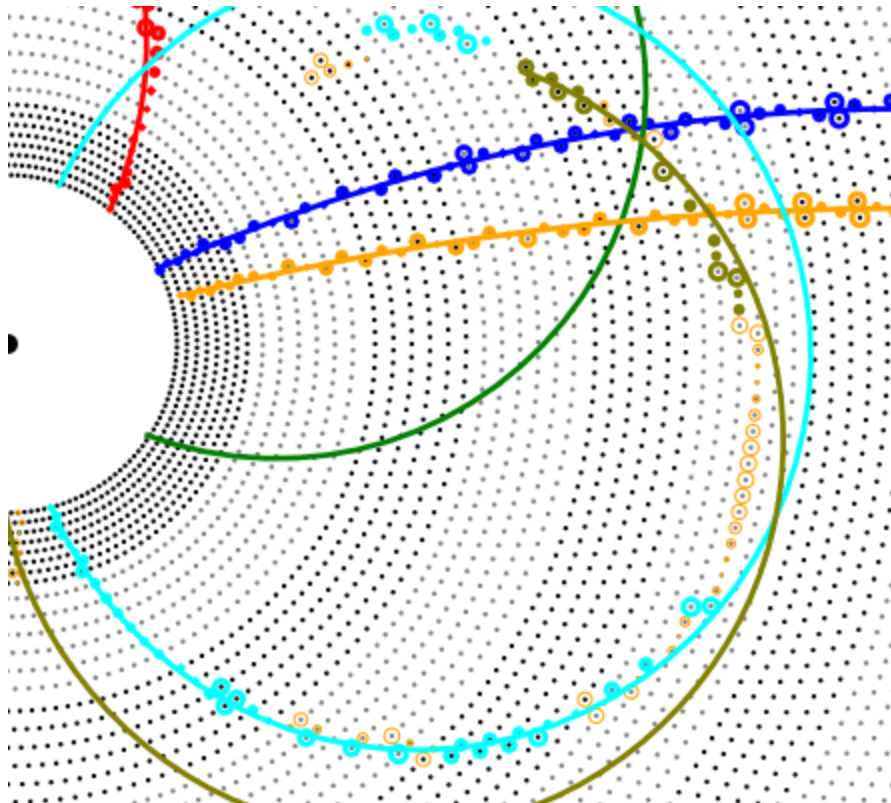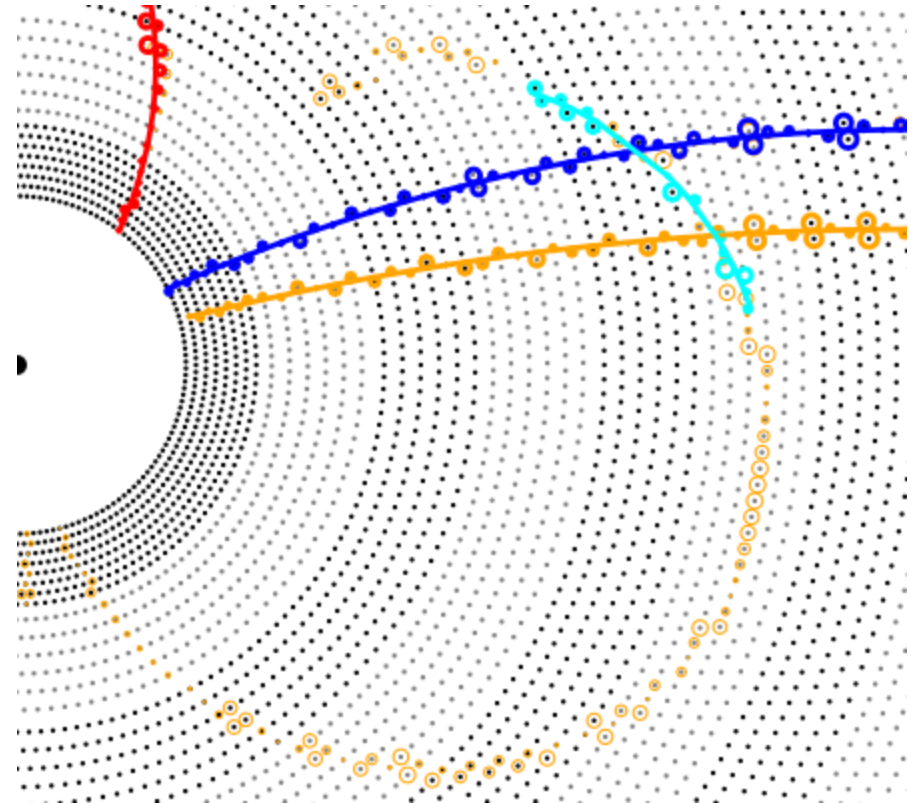
Kink (decay)
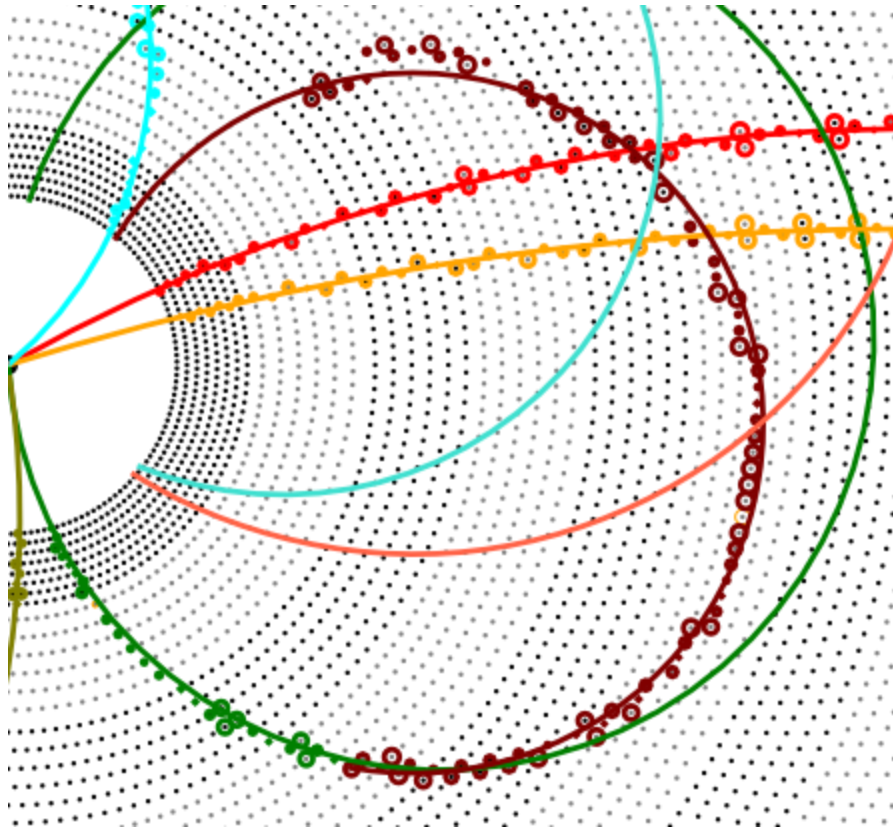
MC finder

Pattern recognition

- In case of the kink wrong hits are assigned to the track and as result its trajectory might be spoiled
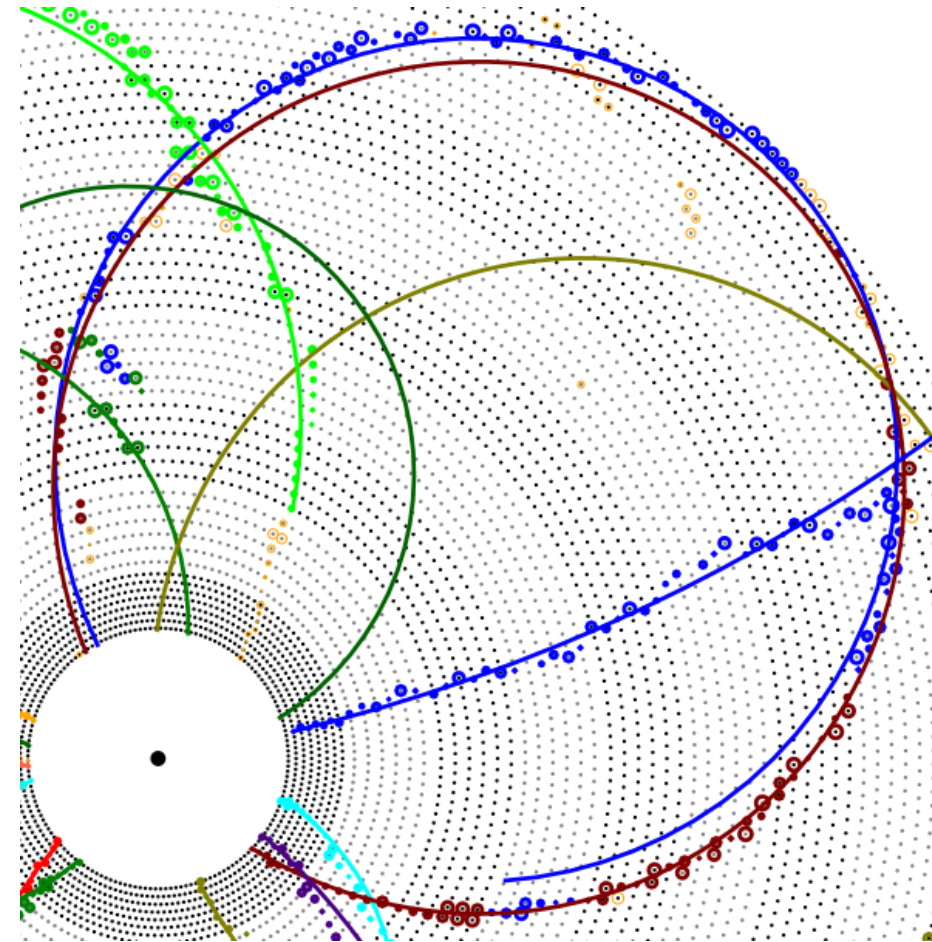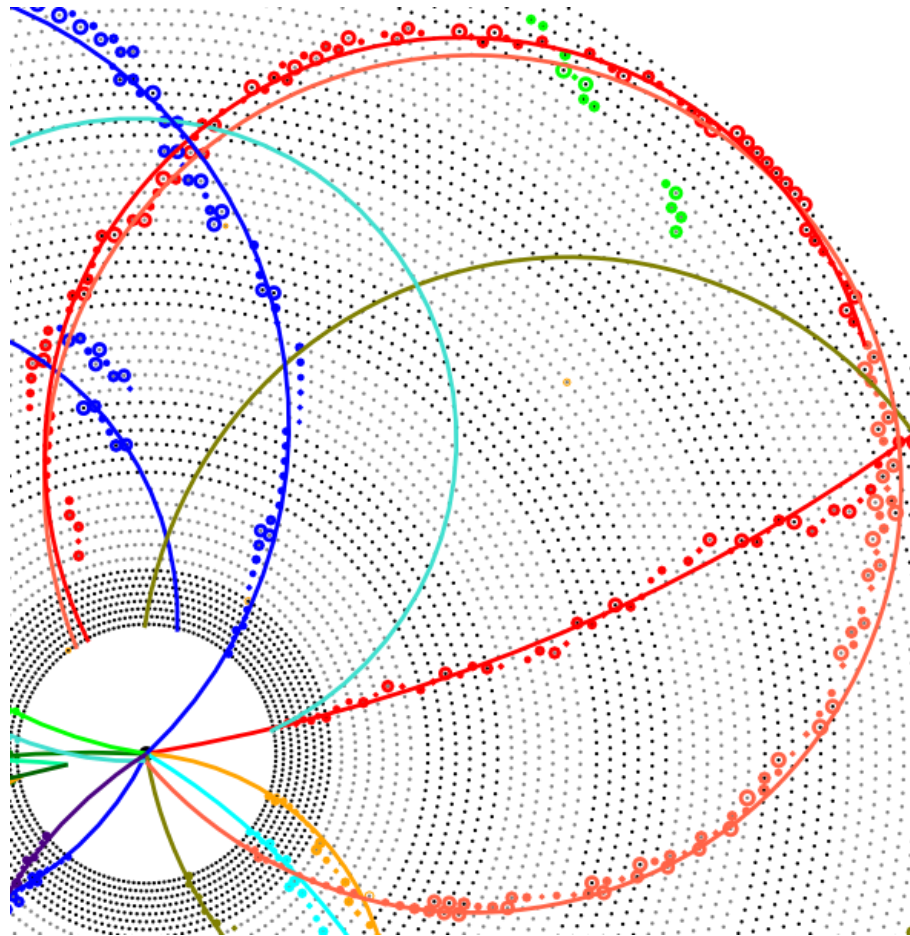
Kink (decay)

Pattern recognition

Genfit

- Genfit fails to fit cyan track (patter recognition track)
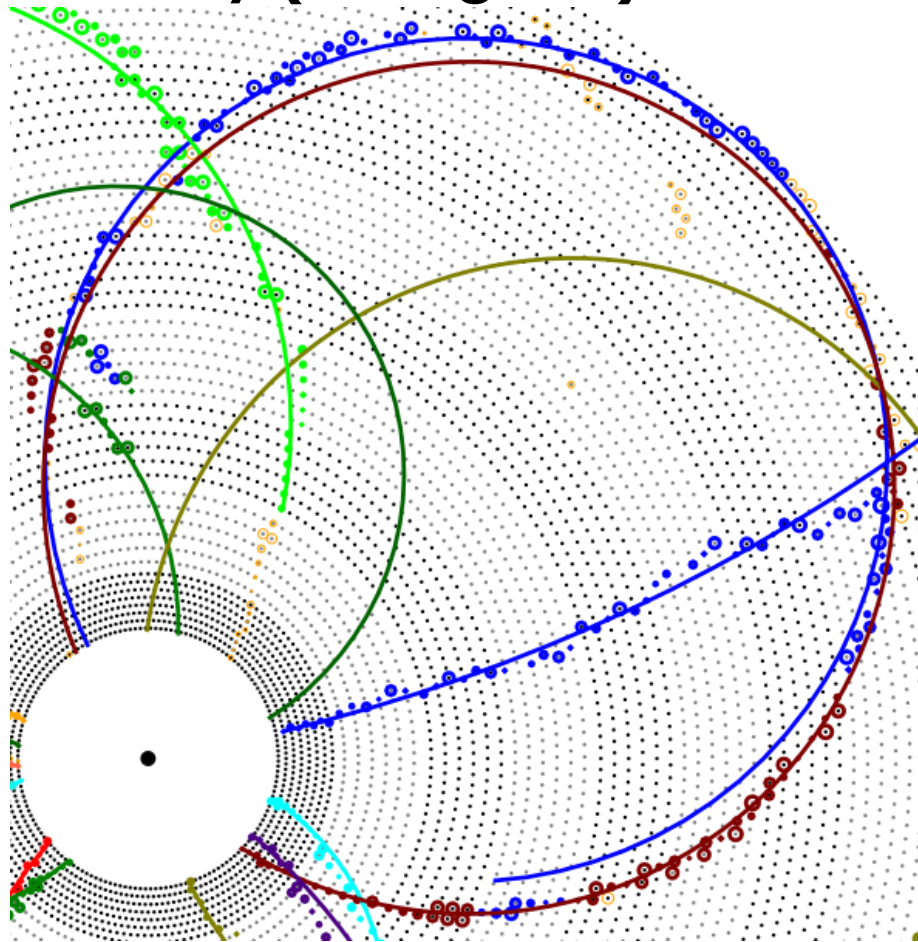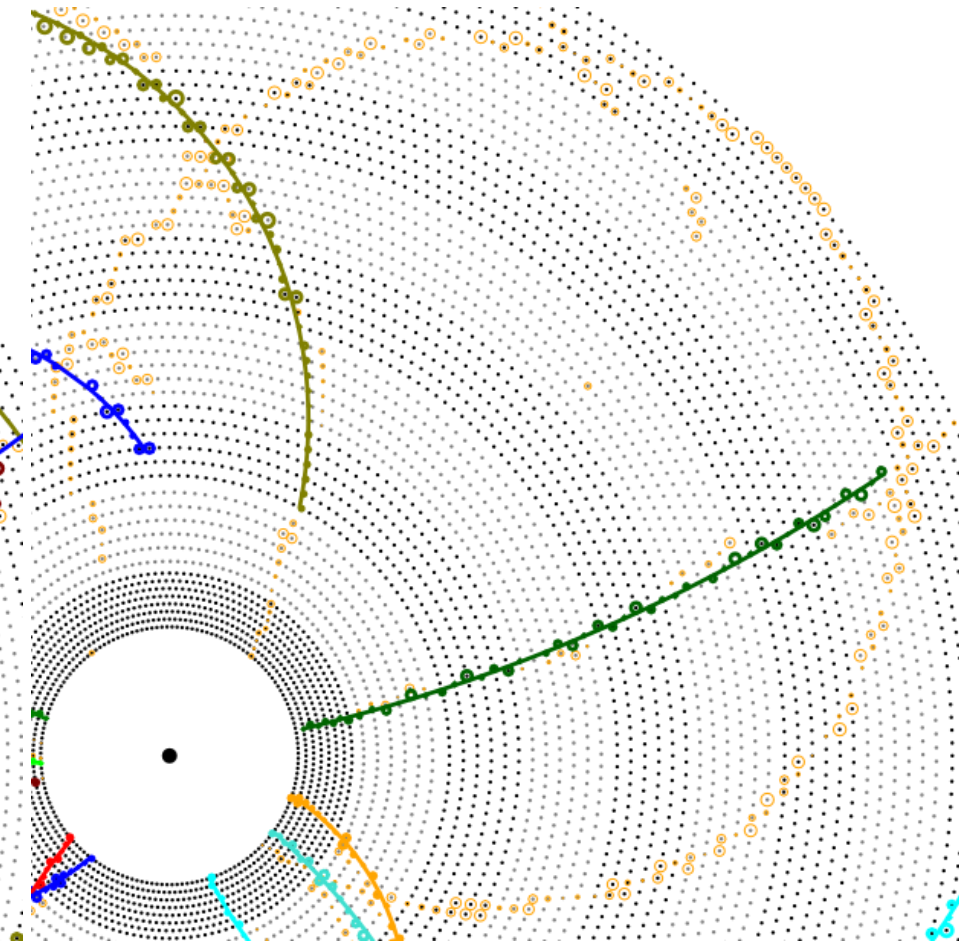
Decay (wrong hits)

MC finder

Pattern recognition

- ◼ Pattern recognition stores two tracks
  - ◼ But some hits are mis-assigned

Decay (wrong hits)

Pattern recognition

Genfit

- Both tracks are failed to fit