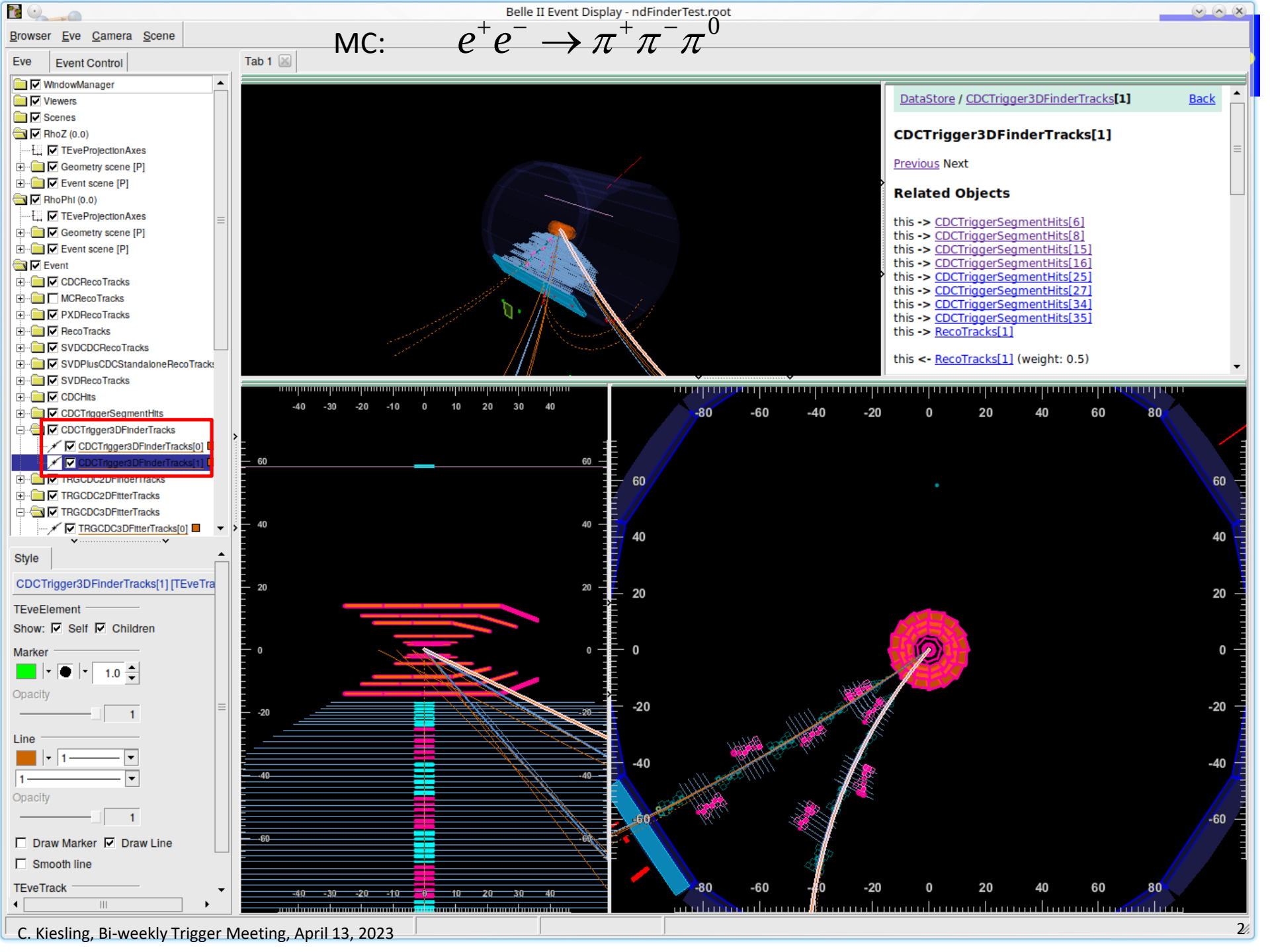
Status 3D Hough Preprocessing
(Parameter Optimization)

- Sebastian Skambraks, who invented the 3D Hough prep, left HEP but is interested to help on consulting function

- Basic (non-optimized) 3D Hough exists in C++ Version within basf2
  more complete program chain exists in python
  Sample program using MC data exist and runs on basf2

- New manpower at MPI -> Simon Hiesl (master student)

- KIT provides implementation into UT4 (-> Kai Unger + students)


Belle II Event Display - ndFinderTest.root
Browser Eve Camera Scene
MC: $e^+e^- \to \pi^+\pi^-\pi^0$
Eve
Event Control
Tab 1
WindowManager
Viewers
Scenes
RhoZ (0.0)
TEveProjectionAxes
Geometry scene [P]
Event scene [P]
RhoPhi (0.0)
TEveProjectionAxes
Geometry scene [P]
Event scene [P]
Event
CDCRecoTracks
MCRecoTracks
PXDRecoTracks
RecoTracks
SVDCDCRecoTracks
SVDPlusCDCStandaloneRecoTracks
SVDRecoTracks
CDCHits
CDCTriggerSegmentHits
CDCTrigger3DFinderTracks
CDCTrigger3DFinderTracks[0]
CDCTrigger3DFinderTracks[1]
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TRGCDC3DFitterTracks[0]
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CDCTrigger3DFinderTracks[1] [TEveTra
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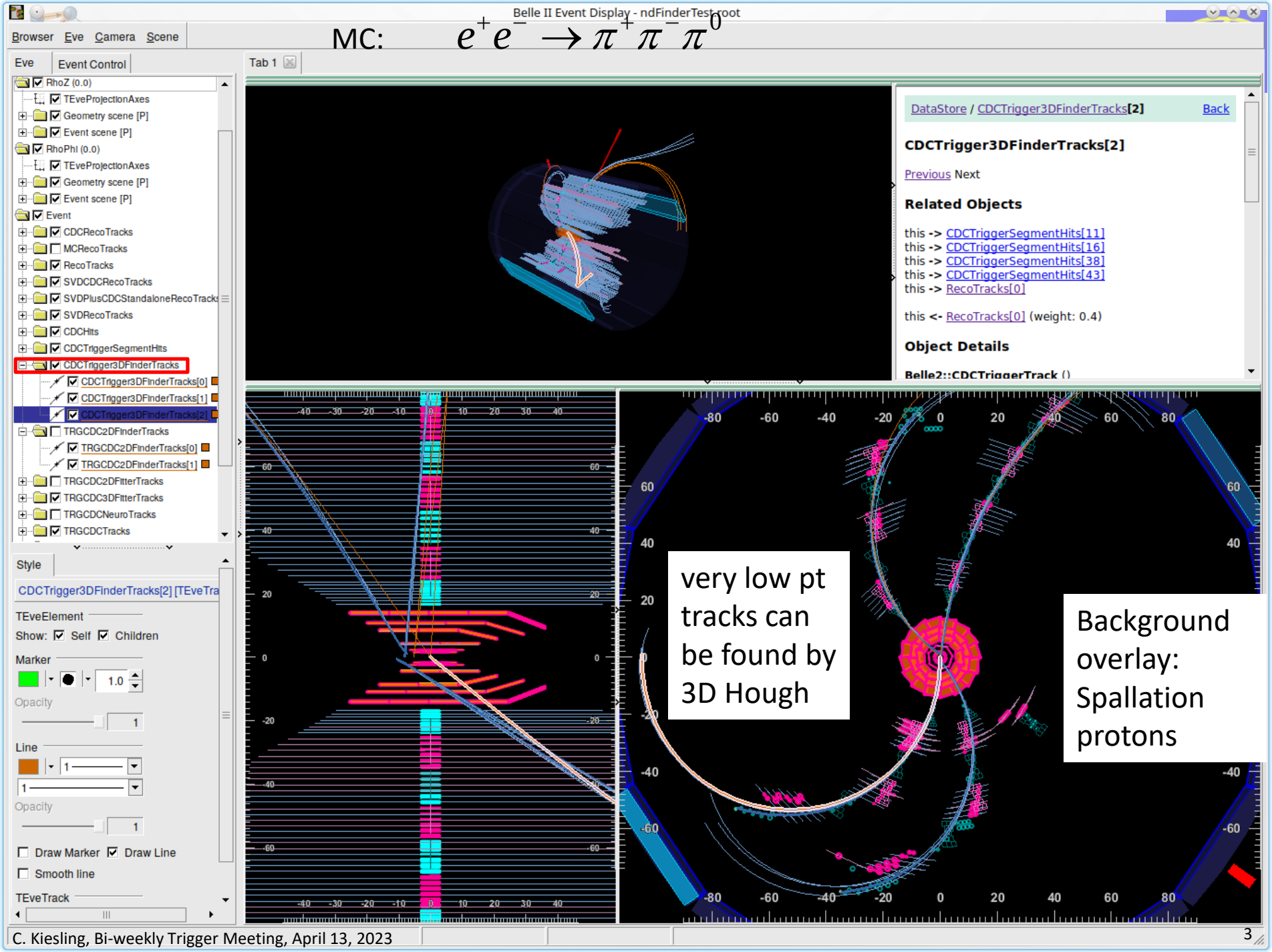
DataStore / CDCTrigger3DFinderTracks[1]
Back
CDCTrigger3DFinderTracks[1]
Previous Next
Related Objects
this -> CDCTriggerSegmentHits[6]
this -> CDCTriggerSegmentHits[8]
this -> CDCTriggerSegmentHits[15]
this -> CDCTriggerSegmentHits[16]
this -> CDCTriggerSegmentHits[25]
this -> CDCTriggerSegmentHits[27]
this -> CDCTriggerSegmentHits[34]
this -> CDCTriggerSegmentHits[35]
this -> RecoTracks[1]
this <- RecoTracks[1] (weight: 0.5)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Geometry scene [P]
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RhoPhi (0.0)
TEveProjectionAxes
Geometry scene [P]
Event scene [P]
Event
CDCRecoTracks
MCRecoTracks
RecoTracks
SVDCDCRecoTracks
SVDPlusCDCStandaloneRecoTracks
SVDRecoTracks
CDCHits
CDCTriggerSegmentHits
CDCTrigger3DFinderTracks
CDCTrigger3DFinderTracks[0]
CDCTrigger3DFinderTracks[1]
CDCTrigger3DFinderTracks[2]
TRGCDC2DFinderTracks
TRGCDC2DFinderTracks[0]
TRGCDC2DFinderTracks[1]
TRGCDC2DFitterTracks
TRGCDC3DFitterTracks
TRGCDCNeuroTracks
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Style
CDCTrigger3DFinderTracks[2] [TEveTra
TEveElement
Show: Self Children
Marker
Opacity
Line
Draw Marker Draw Line
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DataStore / CDCTrigger3DFinderTracks[2] Back
CDCTrigger3DFinderTracks[2]
Previous Next
Related Objects
this -> CDCTriggerSegmentHits[11]
this -> CDCTriggerSegmentHits[16]
this -> CDCTriggerSegmentHits[38]
this -> CDCTriggerSegmentHits[43]
this -> RecoTracks[0]
this <- RecoTracks[0] (weight: 0.4)
Object Details
Belle2::CDCTriggerTrack ()
very low pt tracks can be found by 3D Hough
Background overlay: Spallation protons

Plan & Next Steps

April - May :
- learn and understand Belle II software and the 3D algorithm implemented in basf2
- understand the main features of the algorithm and the characteristics of the various parameters defining the 3D process
- study algorithm on real data (Exp. 26 neuro-skim files)
  (presently, the algorithm is optimized for low pt and small polar emission angles)
- compare the present algorithm (+parameters) with the hardware implementation (KIT + MPI)

June - November:
- optimize 3DHough parameters with main goal to reduce fake tracks
- adapt hardware implementation accordingly
- add neural training to improve (z, θ)-resolution beyond traditional method
- implement set of neural nets into same UT4
- start testing algorithm with cosmic data (most likely no collisions yet in 2023)

December - first month of collision data in 2024:
- final optmization and commissioning of the new trigger

in parallel: integrate „standard“ preprocessing into UT4 (prepare for DL networks)