

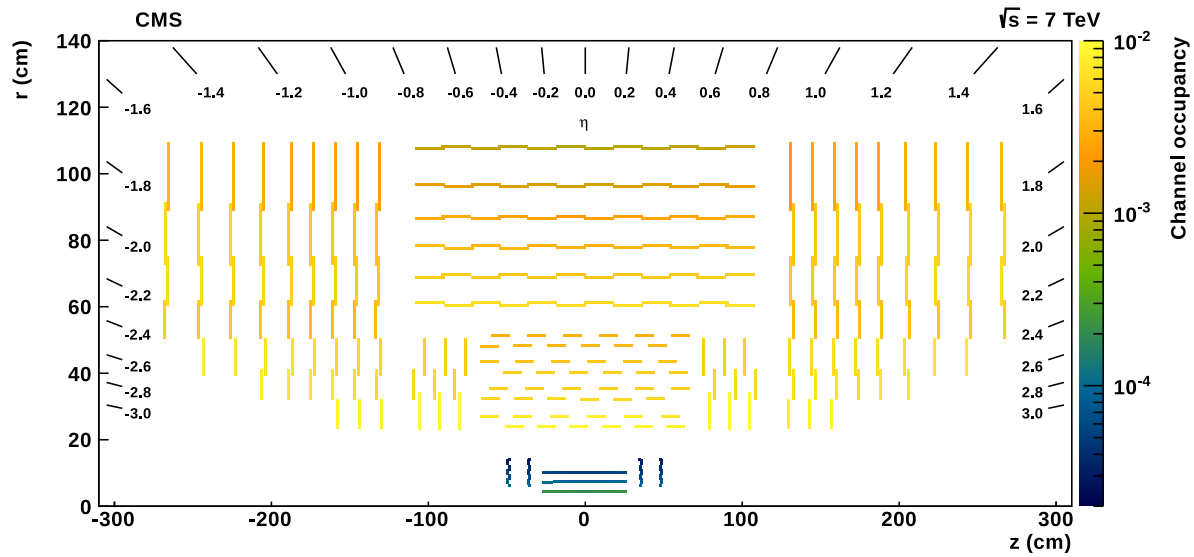
D1: Track Reconstruction based on Cellular Automaton

(Frankfurt group)

I. Kisel

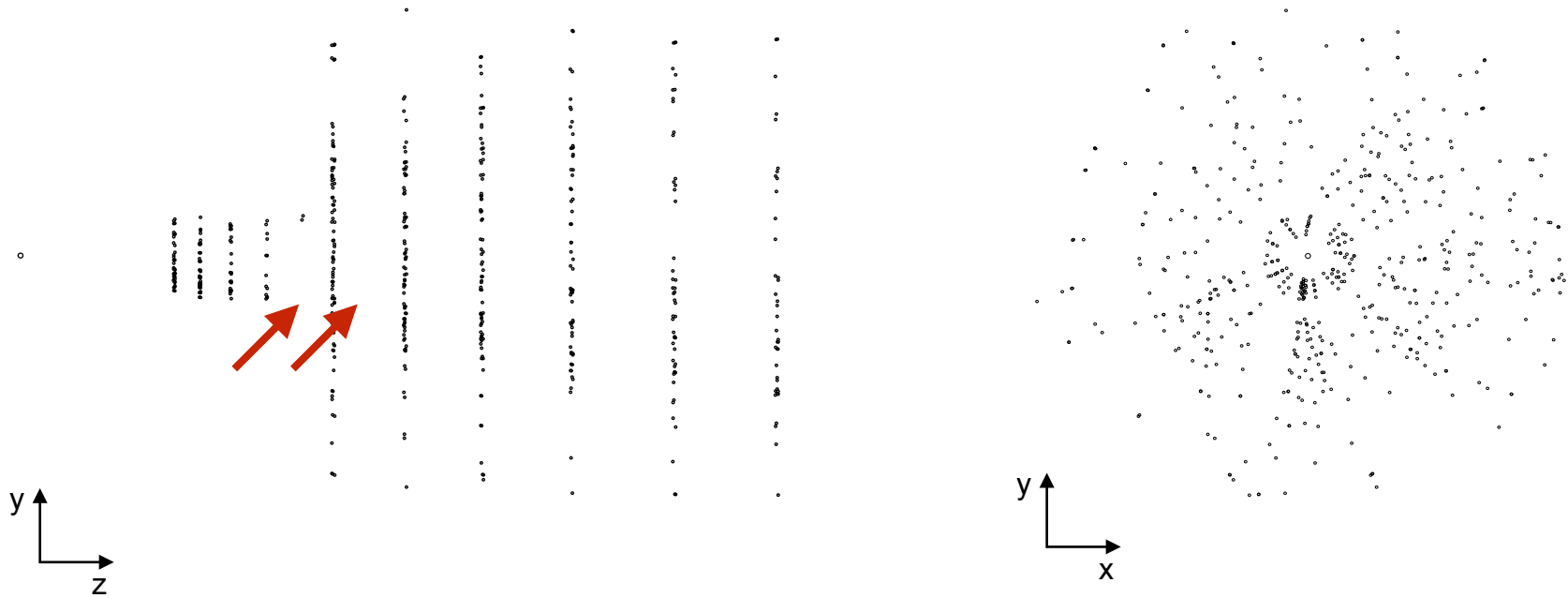
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ACTS



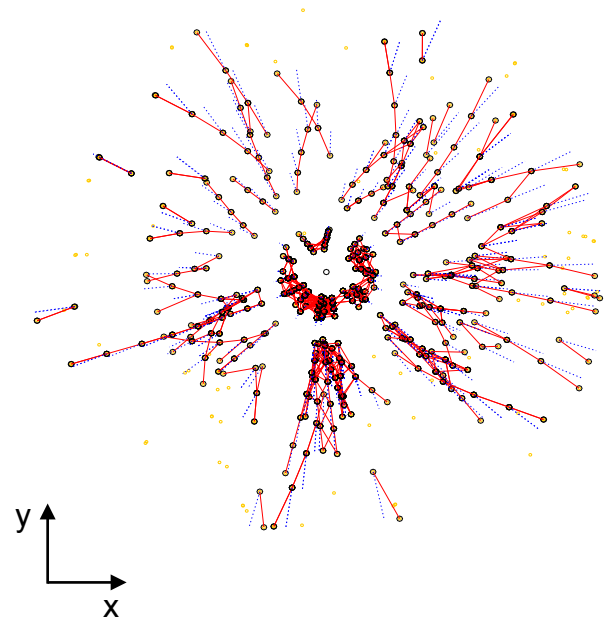
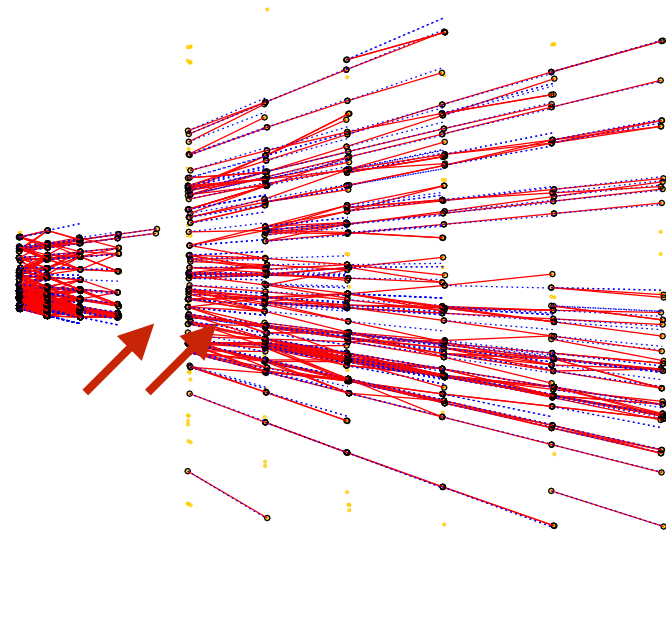
- We use a virtual machine with reproducing the conditions of a working version taken from CERN.

ACTS Simulated Event: Hits



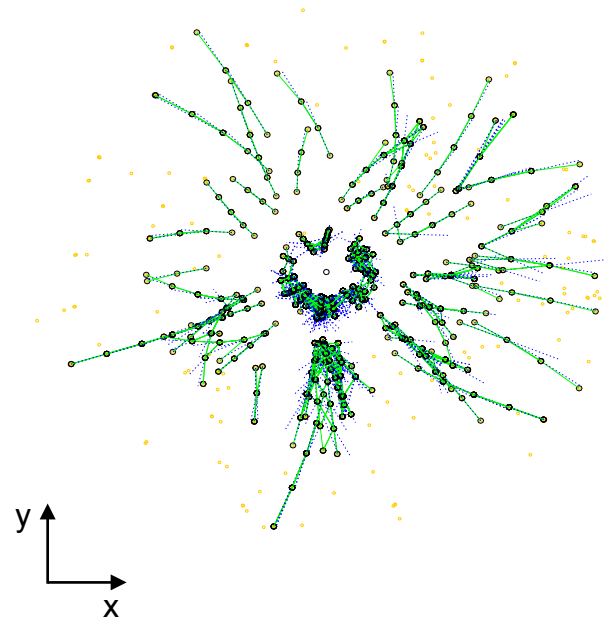
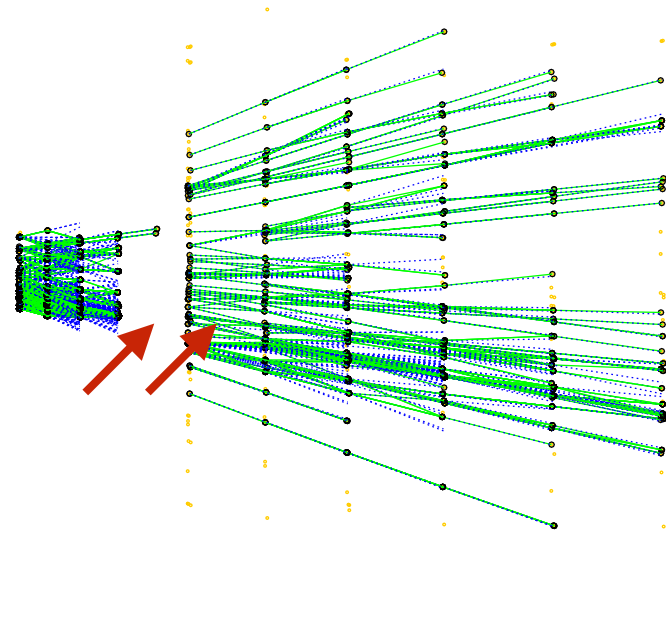
- A simulated event with hits is shown here in two projections.

ACTS Simulated Event: Doublets



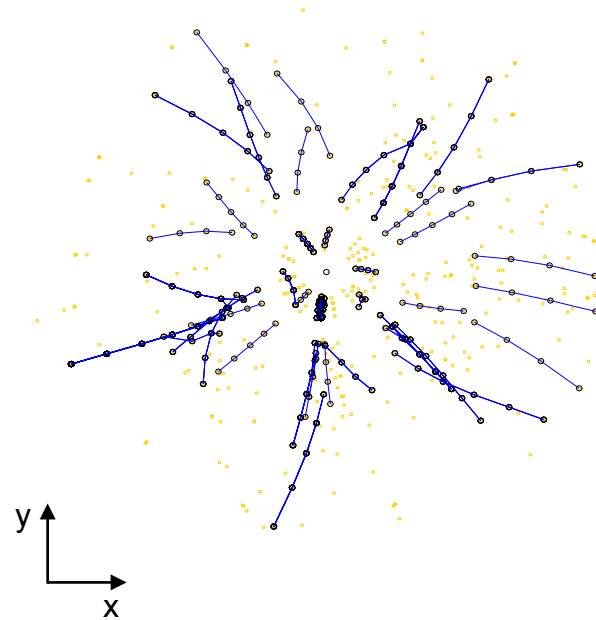
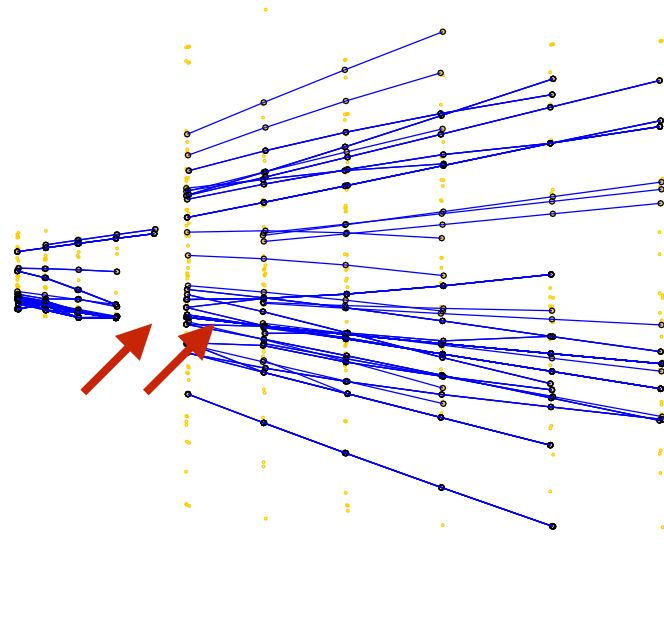
- At the first stage of reconstruction, doublets are produced, i.e. hits are combined at neighboring stations to create elementary track structures.

ACTS Simulated Event: Triplets



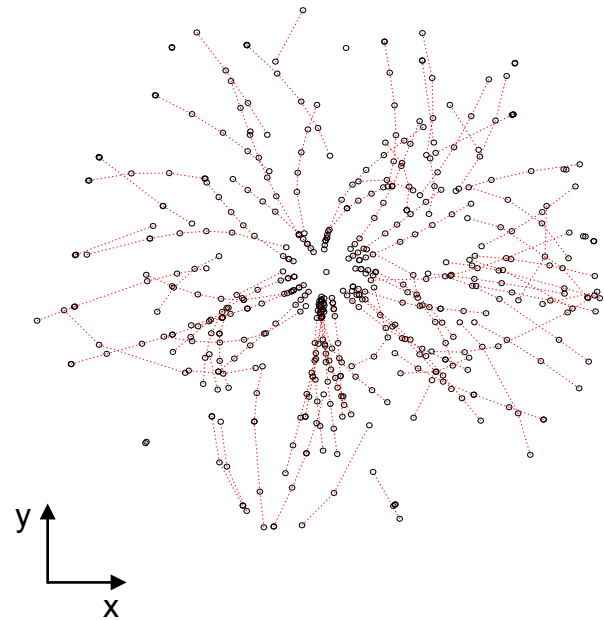
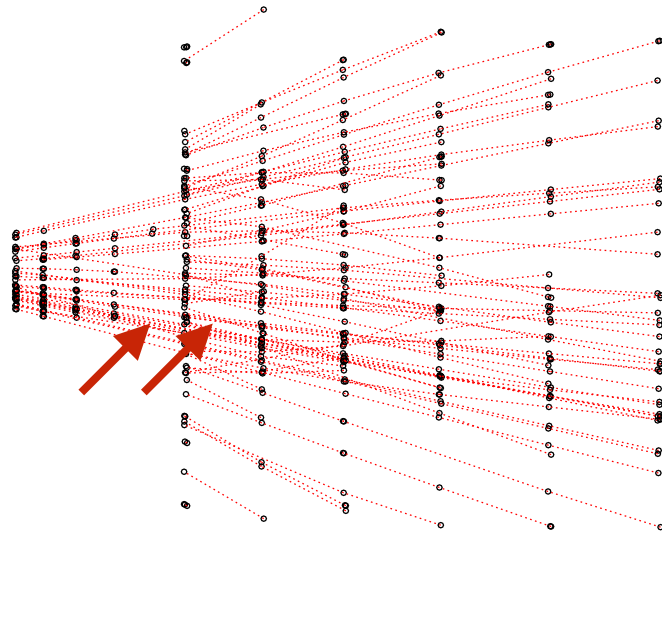
- Neighboring doublets with common hits are joined together in triplets and fit with the Kalman filter to determine the momentum for each triplet.

ACTS Simulated Event: Triplets



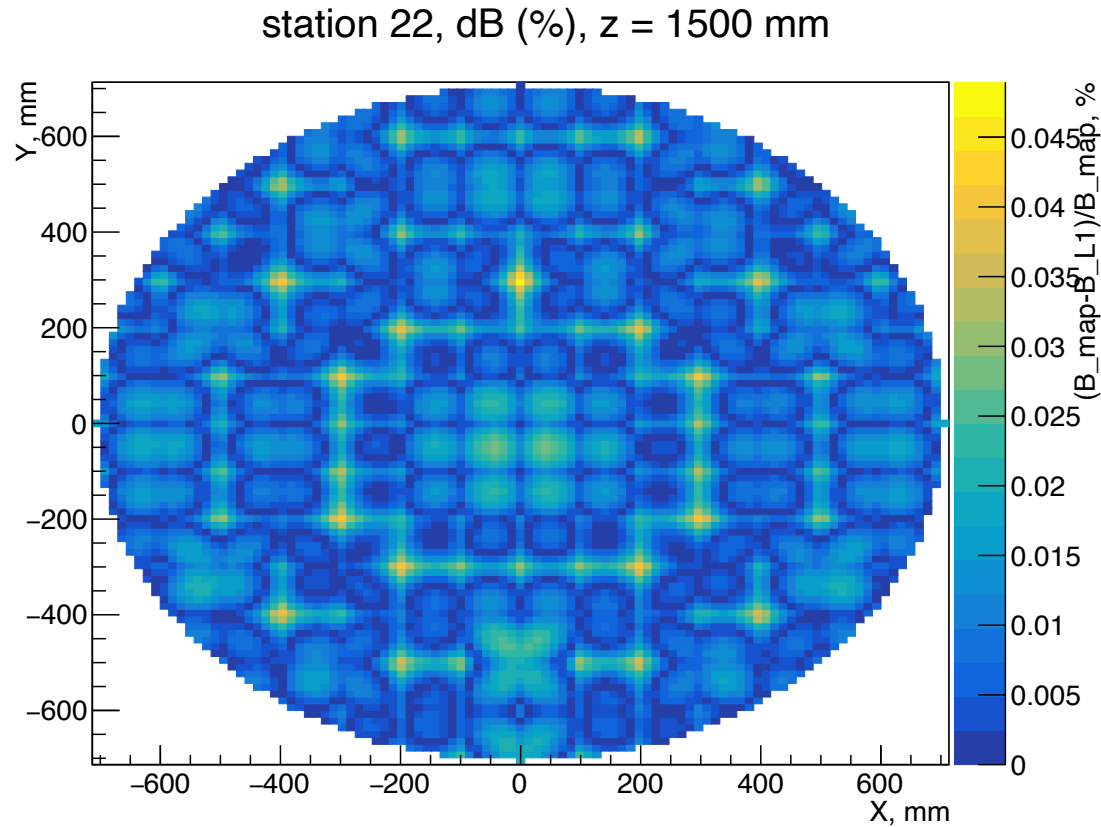
- Then triplets with common points and similar momentum are combined into track candidates.

ACTS Simulated Event: Triplets



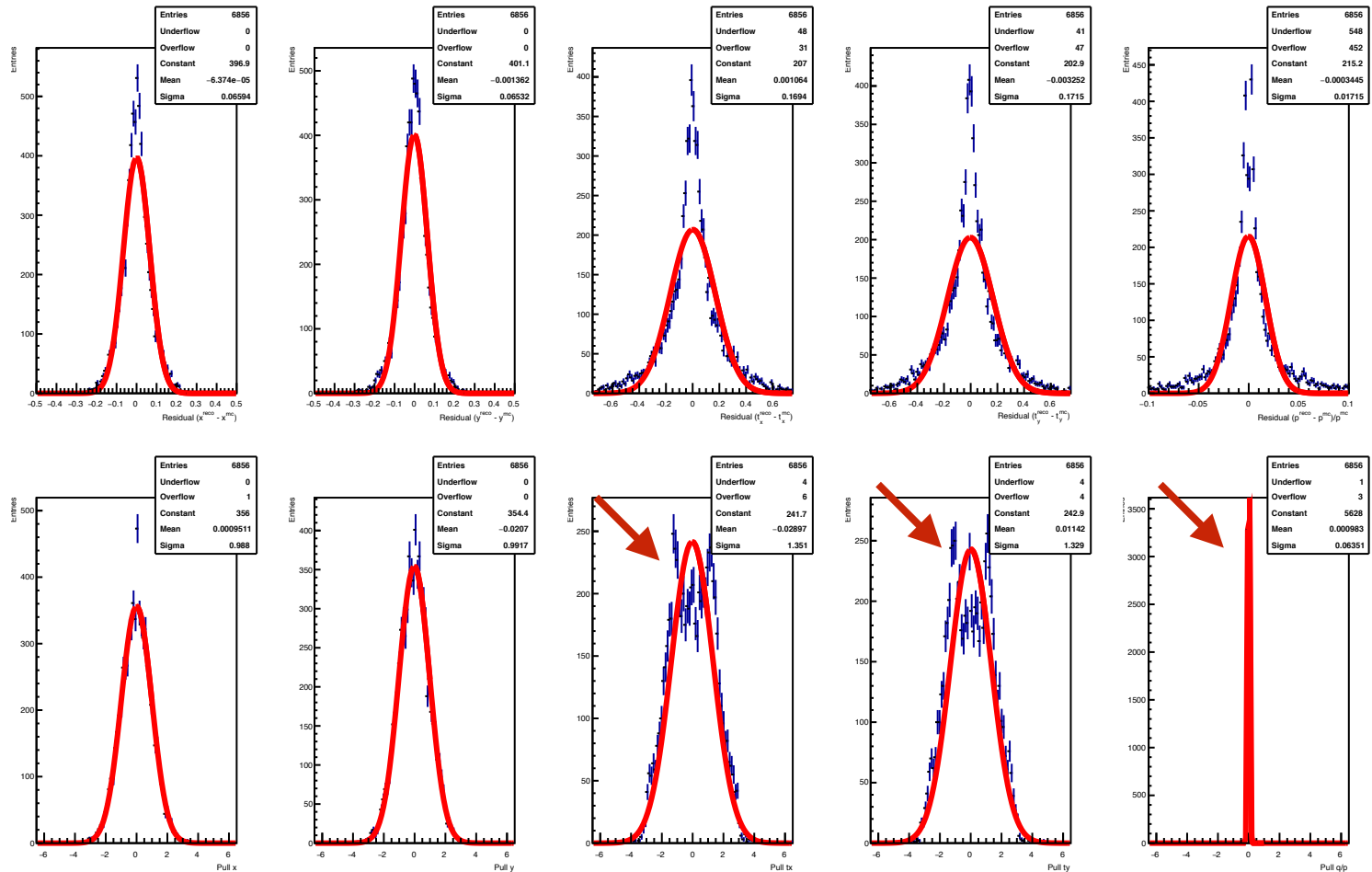
- Ideal track finder using Monte Carlo information.

ACTS Magnetic Field: Approximation



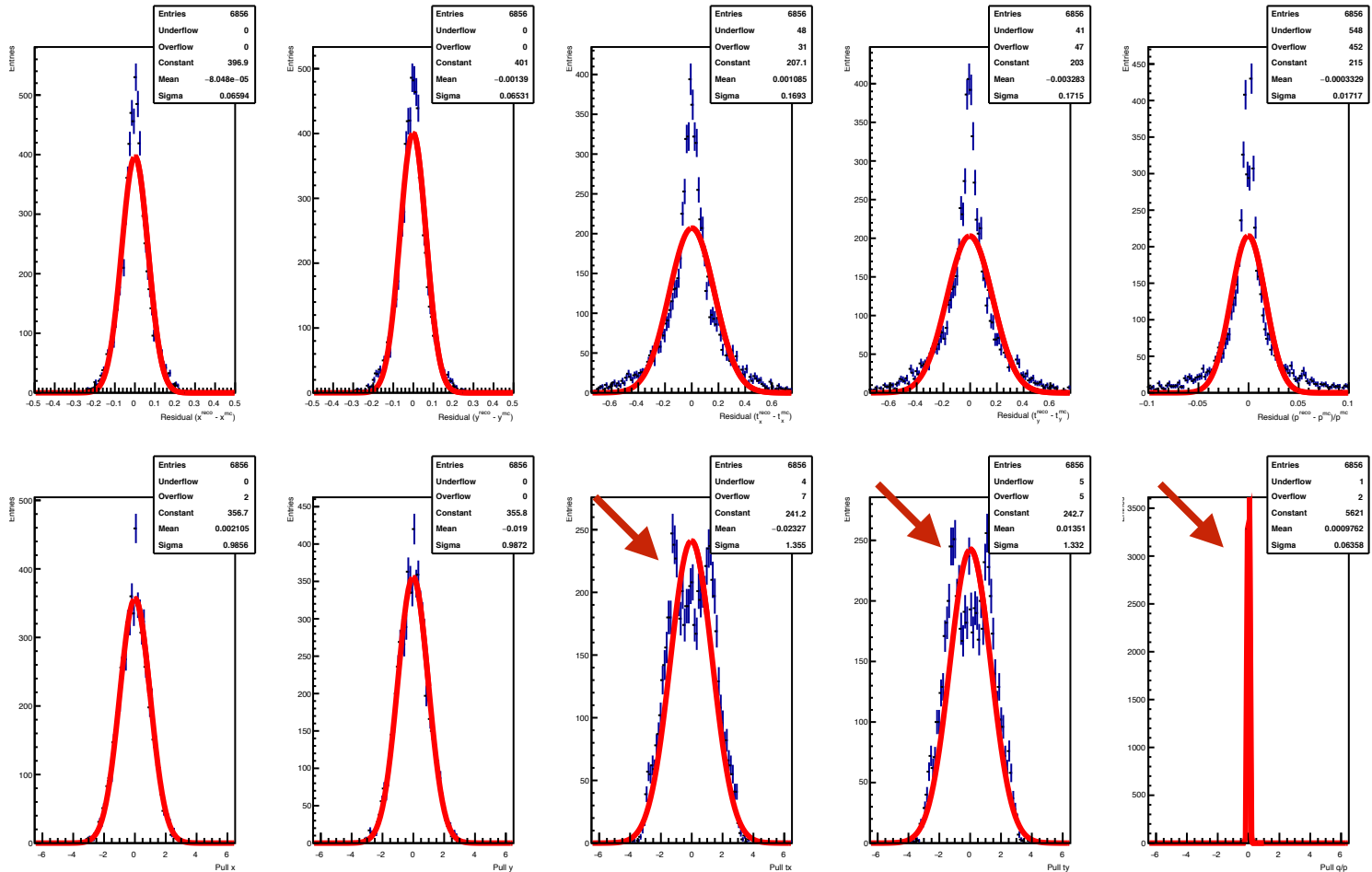
- Magnetic field is approximated locally at each station
- Approximation with 5-th order polynomial
- Magnetic field between stations is calculated using parabola (triplet fit)

ACTS Kalman Filter Track Fit: Runge-Kutta



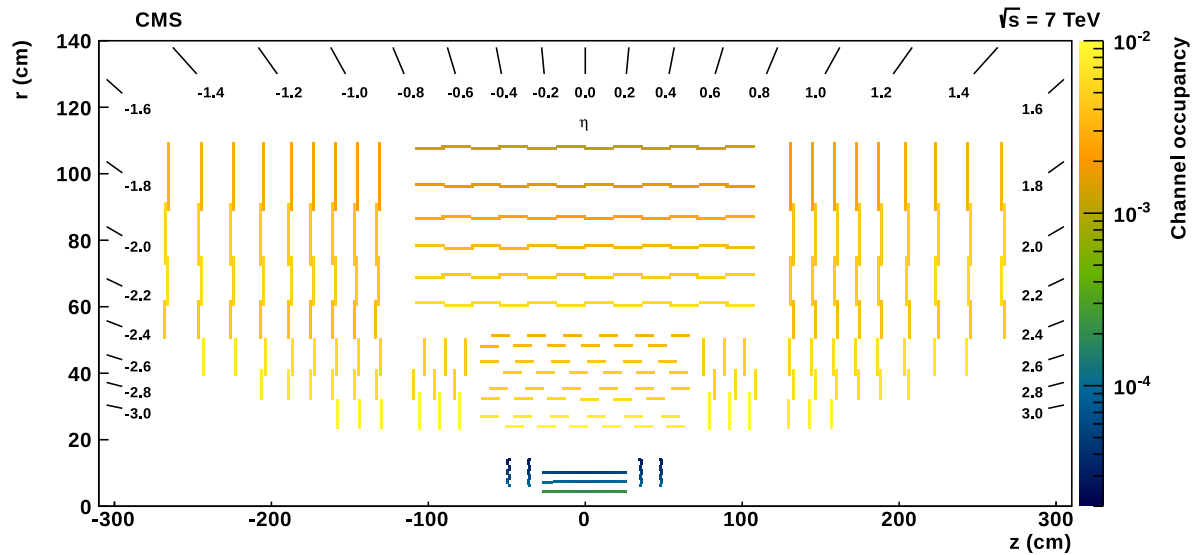
- Working with material budget (multiple scattering and energy losses)

ACTS Kalman Filter Track Fit: Analytic Formula



- Working with material budget (multiple scattering and energy losses)

Summary



- We have created a full track reconstruction procedure in ACTS.
- Currently we are now working on the careful debugging of all its parts.