CA Tracking

S.Gorbunov, I.Kisel, M.Pugach

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Outline

- Introduction

- Cellular Automaton tracking

- Current Status & Results

- Summary & Outlook

Introduction

- Tracking in forward detectors for the PANDA experiment is considered in this presentation:

    - MVD (Forward part)

    - FTS

- Features, Results and Perspectives of the CA approach are discussed.
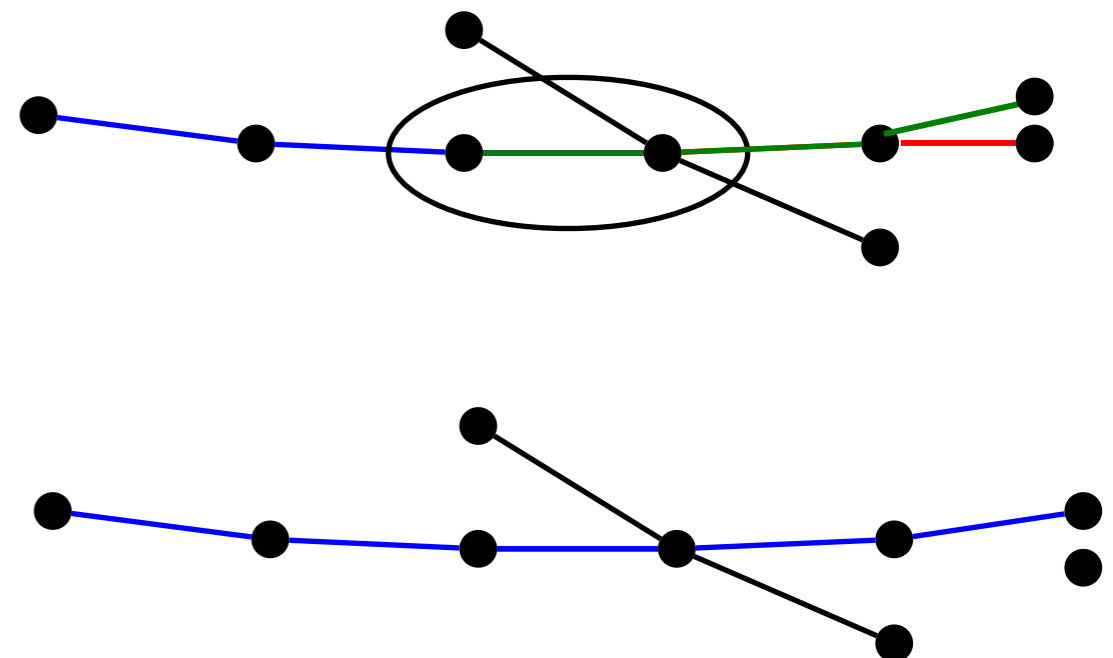
Cellular Automaton Tracking

- **Input/Initialisation**

- **Tracklet construction**
  - **Singlets**
  - **Doublets**
  - **Triplets**

- **Evolution**
  - **Neighbour Search**
  - **Track Construction**

- **Performance evaluation**

- **Parameters**
  - **Kalman Filter**
    - **Extrapolation**
    - **Update**

Current Status and Results

- Efficiencies

- Residuals and Pulls

- Fitting Approaches
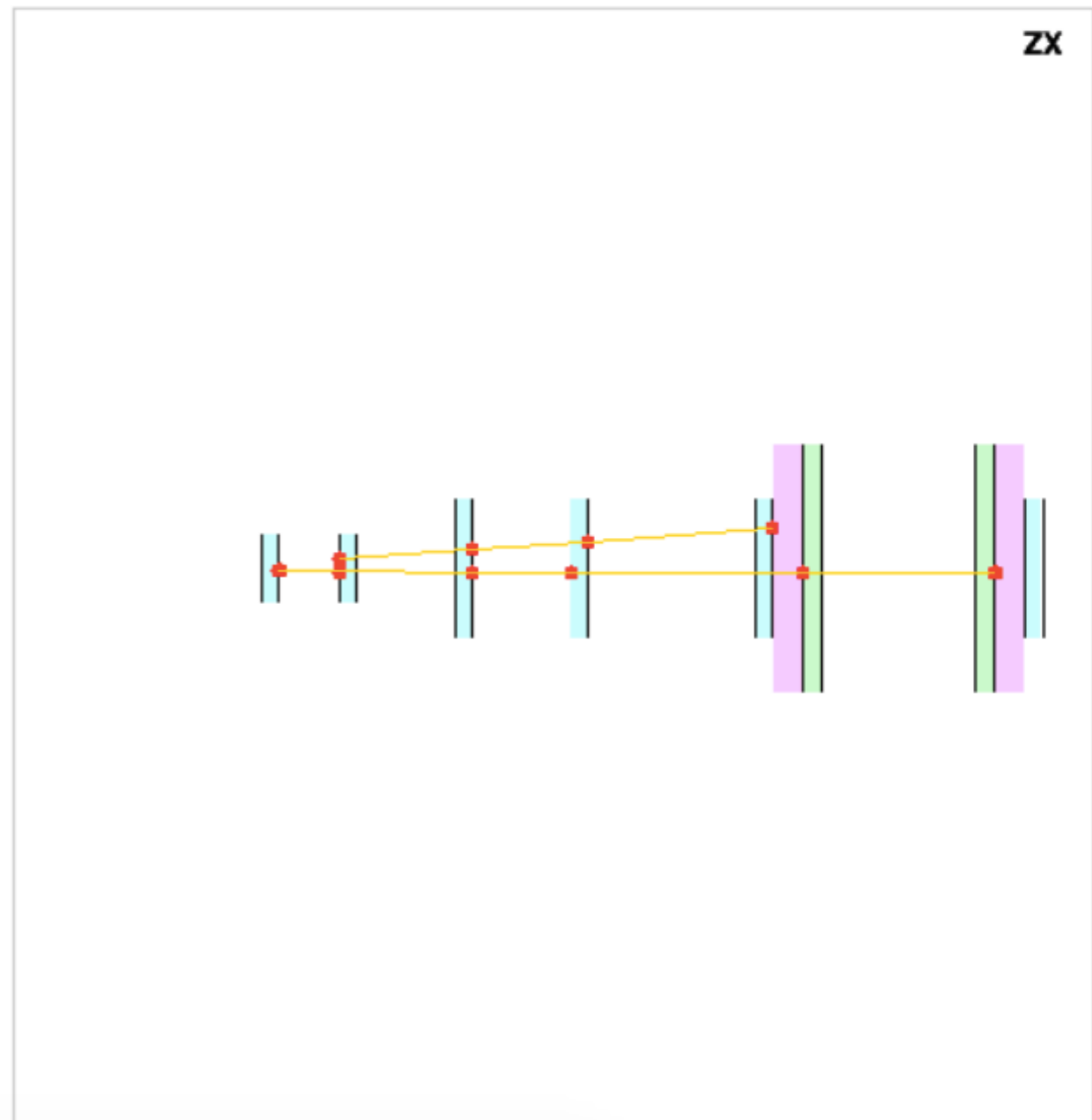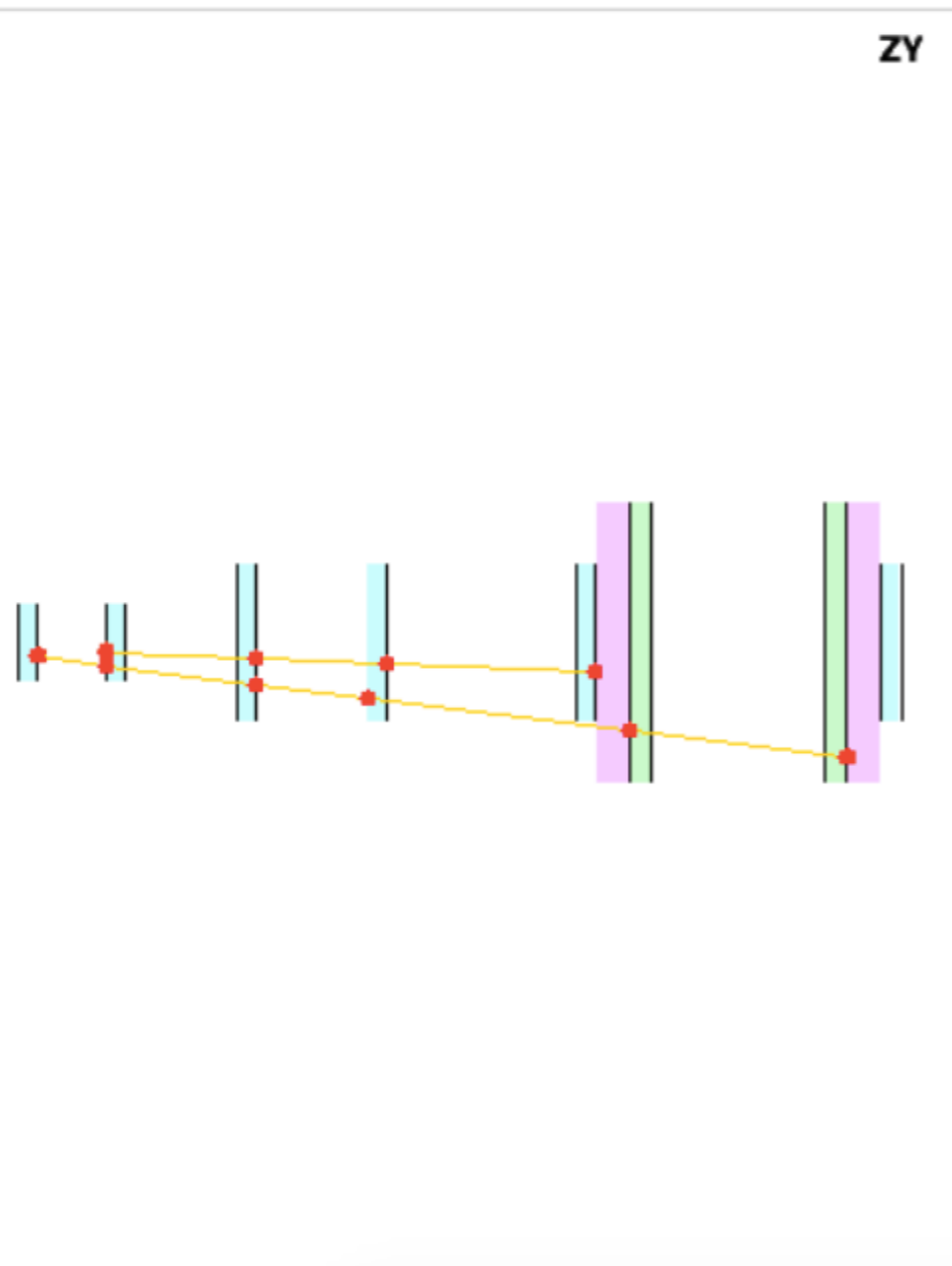
- Activities

Efficiencies

1000 BoxGenerator events
purity=100%
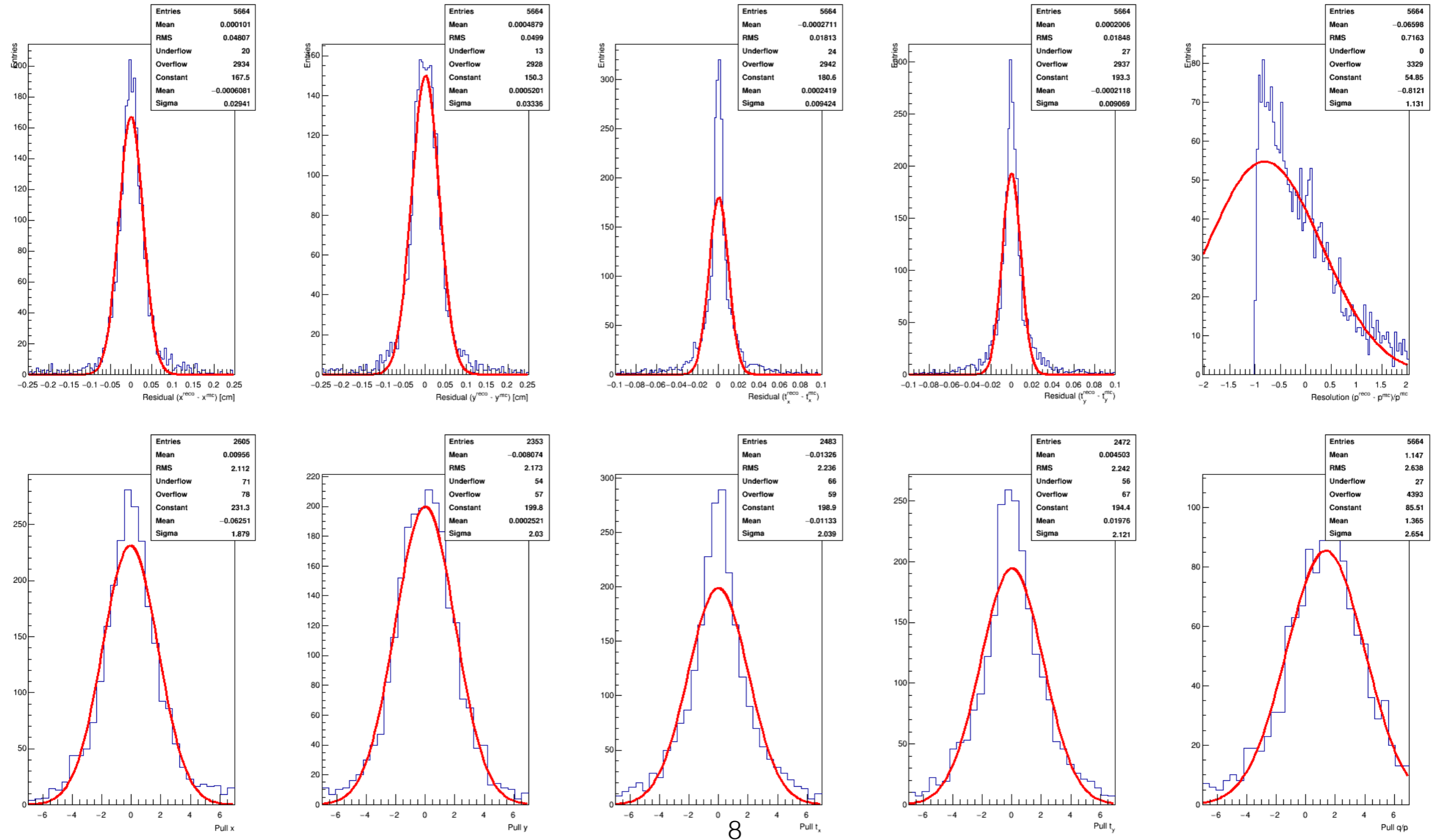
Reconstructable track:
>= 3 consecutive MC points

	Efficiency,%	Ghost/ev	Clone/ev	Tracks/ev
triplets	100	12.5	9.5	1
track candidates	100	71.6	50.5	1
tracks	No selection yet because of KF debugging …			

Event Display
Reconstructed Tracks

Residuals and Pulls

Fitting Approaches

- **Runge-Kutta 4th order method**

  - Standard iterative extrapolation method of the KF.

  - Restricted to one track-model as far as calculations are performed only in the track parameter space.

- **Analytic Formula**

  - Direct calculation of the extrapolated parameters.

  - Same precision as the RK4-method.

  - **Feature:**

    - Extrapolate in the space of physical parameters (e.g. $\{x,y,z,p_x,p_y,p_z\}$) rather than being restricted to the track model parameters space.

    - Opportunity to perform track model parameters conversion into physical parameters and vice versa.

    - For example, if a track has to be propagated from a forward detector station to a barrel detector station the following conversion could be implemented:

$$z,\{x,y, t_x, t_y, q/p\} \longrightarrow x,\{y,z, p_x, p_y, p_z\} \longrightarrow x,\{y,z,\sin(\phi),Dz/ds, q/p_t\}$$
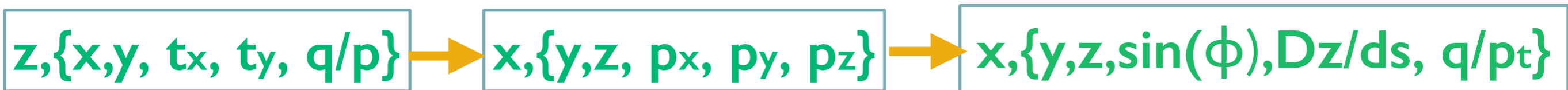
Activities

- Both track propagation approaches were studied and have shown almost same results.

- *GenFit* fitting package is being explored currently to compare track fitting quality with other packages.

Summary & Outlook

- Fwd Mvd tracking almost done (~80%).

- The obtained experience and code to be implemented (next week starting) in:

  - **Fwd MVD + FTS**.

  - **FTS standalone** (based on I.Kulakov code).