Single e^- reconstruction with CGEM+ODC and MC ideal tracking

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Assumptions in simulation

- **CGEM toy cluster**
  - 100% cluster efficiency
  - Spatial resolution 130 μm in both X and V direction

Software for e^- reconstruction

- CgemBoss665g

- New Least-Square global track fitting used (circle and helix fitting)
  - ✓ circle fitting rejects hits with large χ^2
  - ✓ helix fitting rejects outermost hits if χ^2 is large => favor track segment near IP => track parameters at IP
  - ✓ tag: DotsConnection-00-00-05

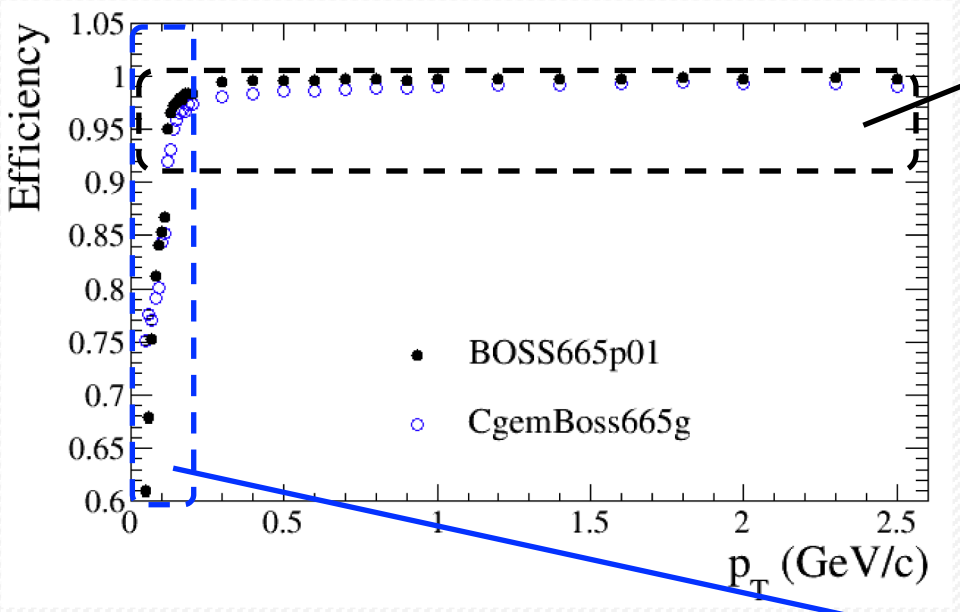
- Tuned HoughTransAlg for π^- with p_T=50 MeV/c
  - ✓ Circle search/reconstruction criteria loosen => keep efficiency high
  - ✓ V-hits association procedure modified
  - ✓ tag: HoughTransAlg-00-00-18

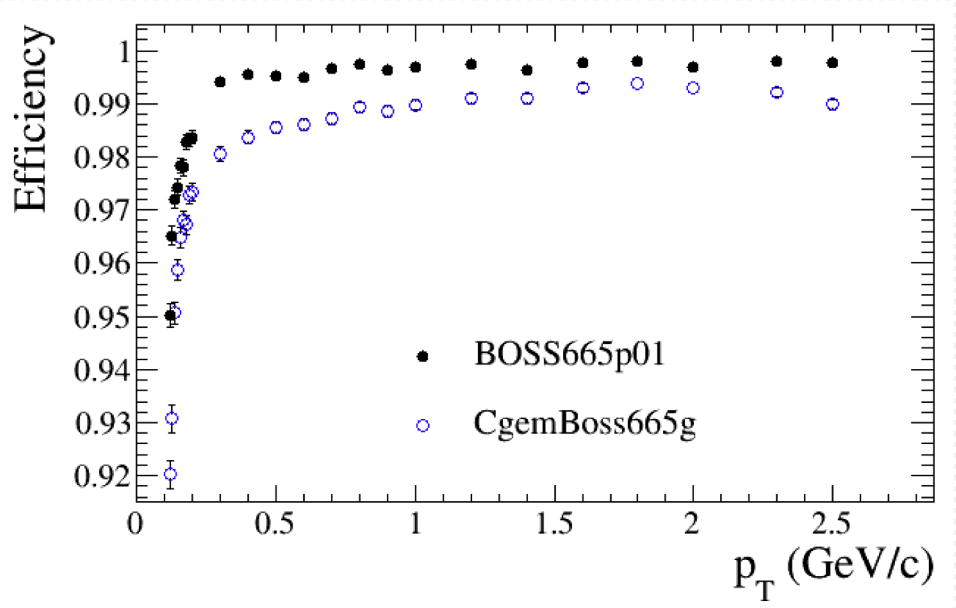
Good track and tracking efficiency

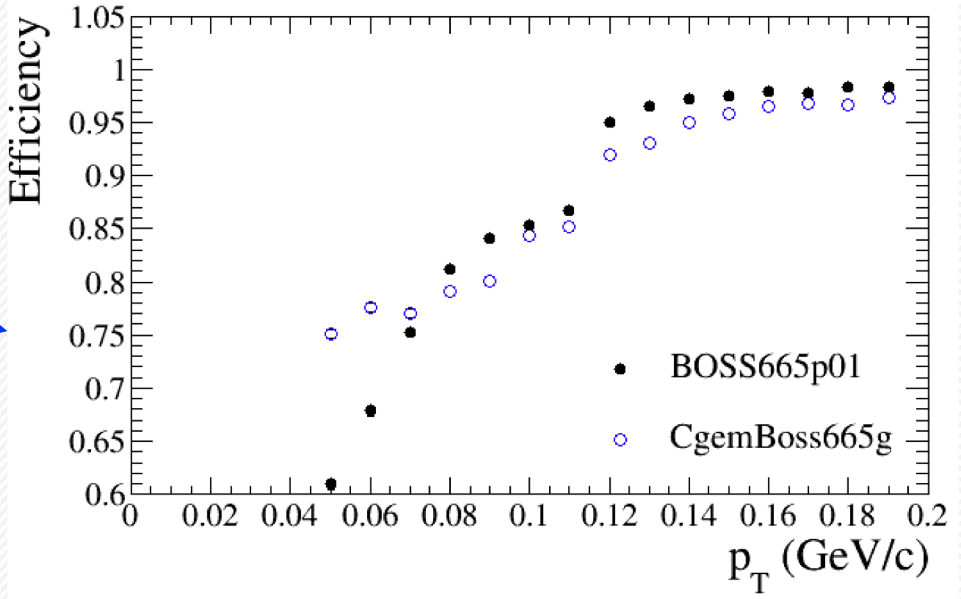
- Good track: $|dr|<1.0cm$, $|dz|<10cm$, $|\cos\theta|<0.93$, correct charge

- Tracking efficiency for single track events:
  $\varepsilon = N_{good}/N_{gen}$
  where N_{good} is the number of events with one or more good tracks reconstructed,
  N_{gen} is the number of events generated/simulated

Tracking efficiency for single e⁻

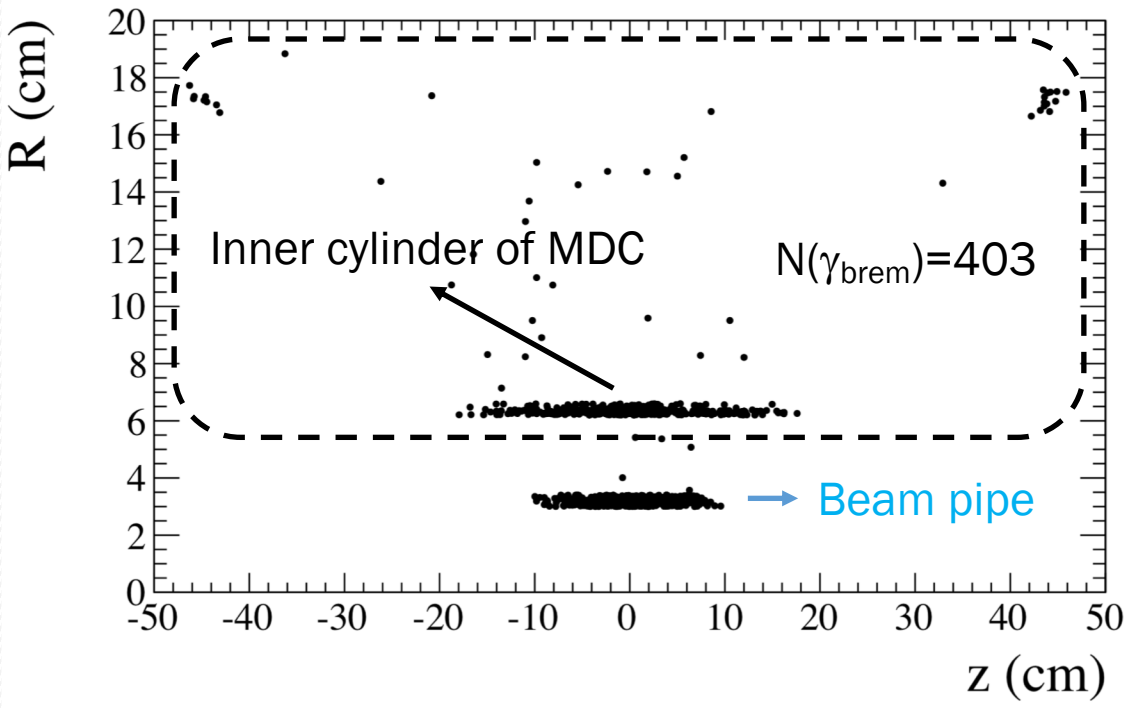




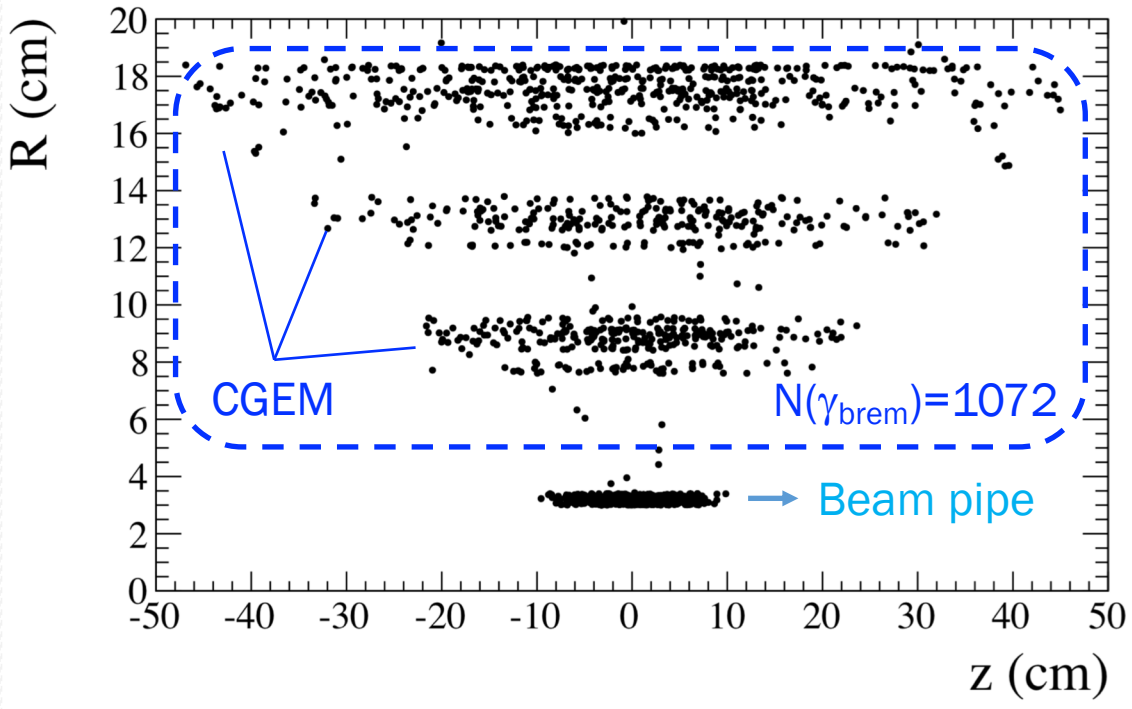


Bremsstrahlung for single e^- with p_T=1 GeV/c

10,000 events generated



Brem. position ($E_{\gamma brem}$>50 MeV)
in the case of **MDC**



Brem. position ($E_{\gamma brem}$>50 MeV)
in the case of **CGEM**+ODC

More bremsstrahlung in CGEM
R is larger => more displaced vertexes

Association information of MC-particle, MC-hits and digi/cluster in simulation

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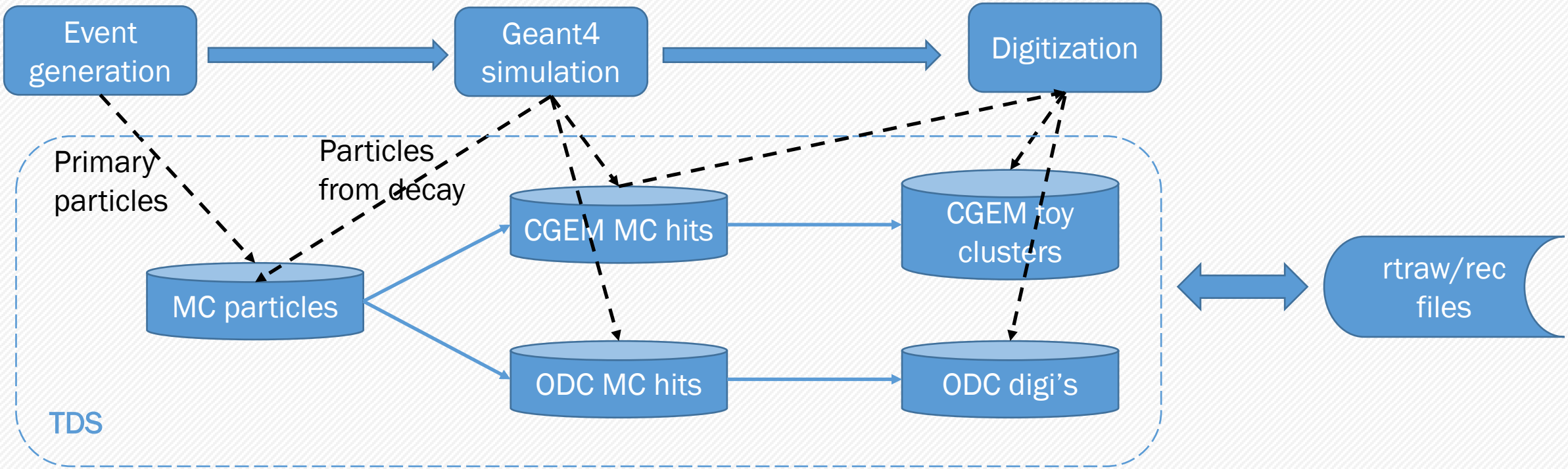

→ Association information added

One application with the information is track validation
(See Lia's talk)

MC ideal tracking

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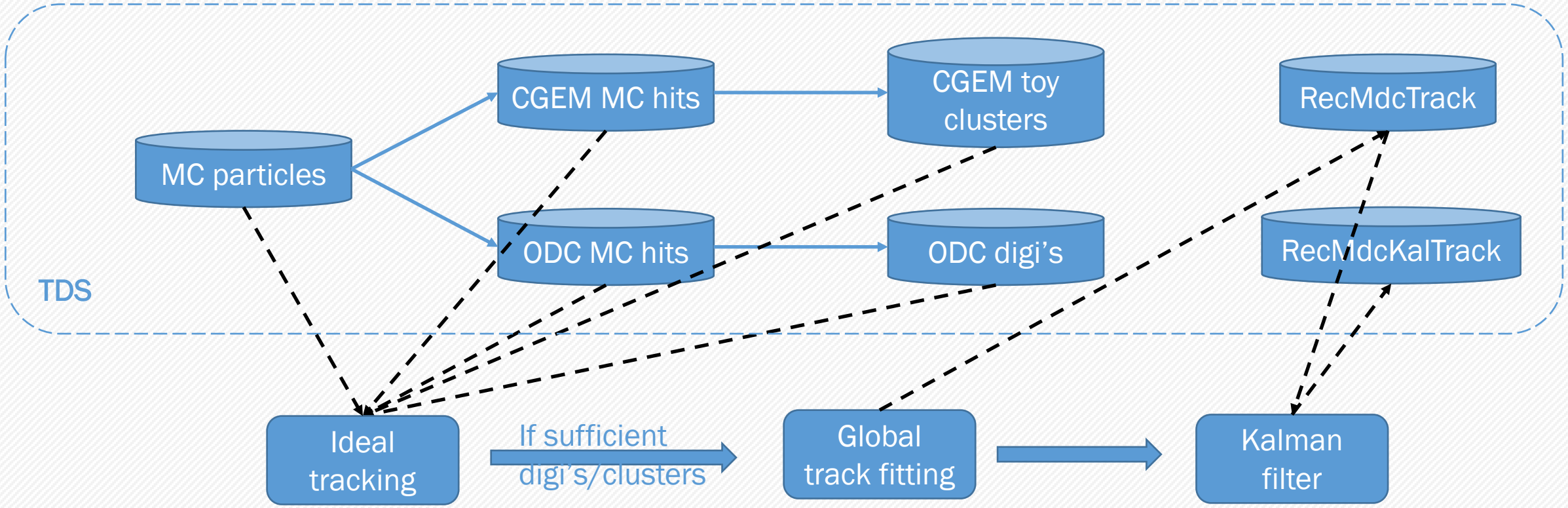

Loop MC particles
Associate digi's and clusters

MC ideal tracking

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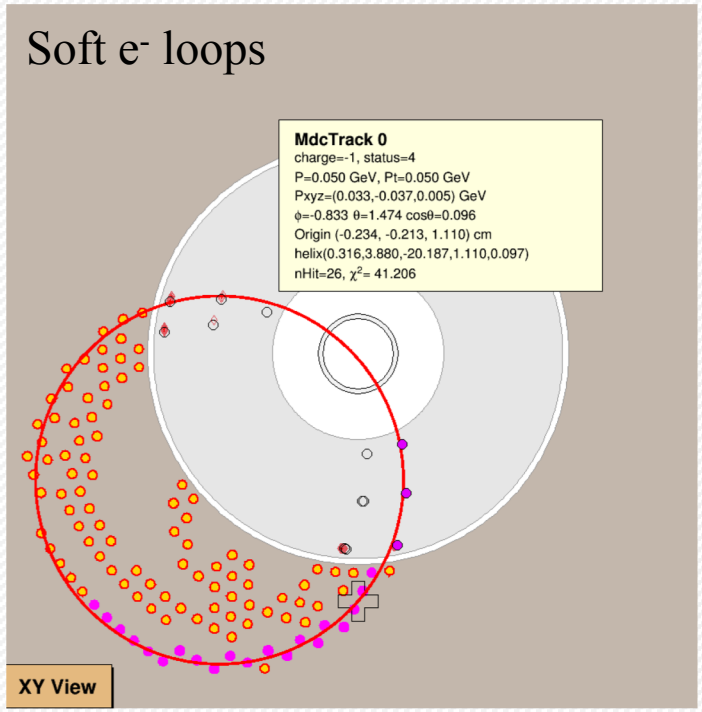

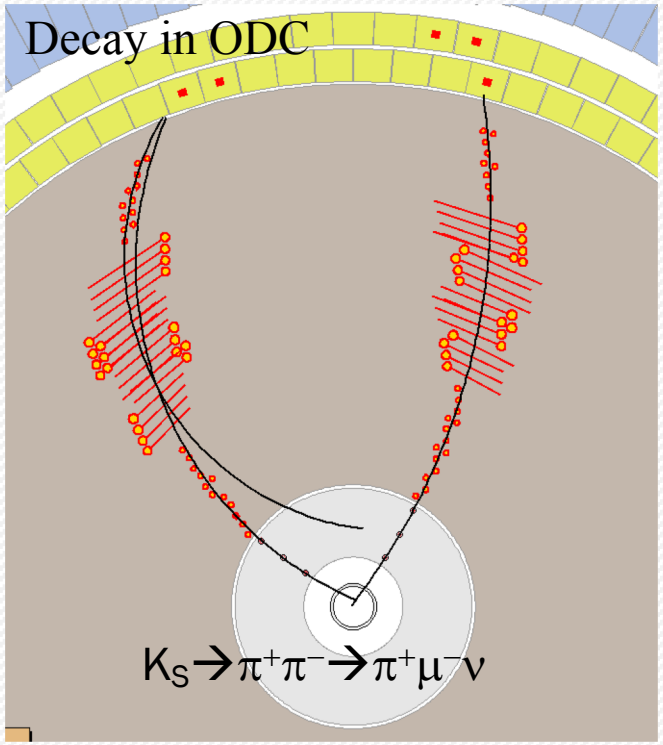

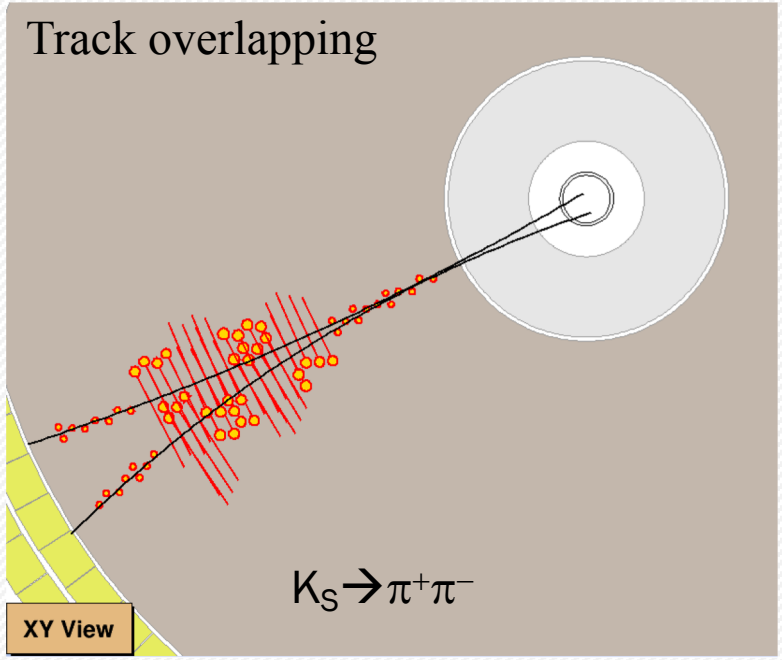

Useful tool to tuning of track finding algorithm

Summary

- Check of e- reconstruction
- Electron bremsstrahlung (~2.5 times E_{brem}>50MeV in CGEM if vs IDC)
- Association of MC-particle, MC-hits and digi/cluster in simulation
- Ideal tracking

➢ Next steps:
  ➢ tune global track finding for soft e-