Tracking in org.lcsim

Linear Collider Software Meeting

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Christian Grefe

Current Status

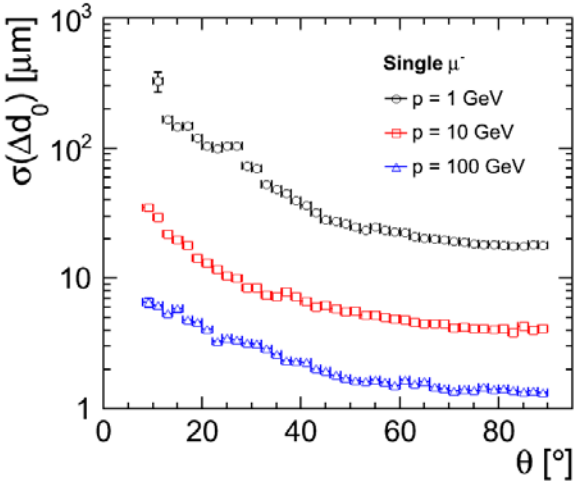
- Sophisticated tracker hit digitization: SiSim
  - Planar tracker geometry (layers made of individual modules)
  - Supports pixel, strip and stereo-strip layers (including ghost hits)
  - Charge simulation and clustering (possibility of generating noise hits)
- Convert 1d-, 2d strip hits and pixel hits into generic “HelicalTrackHits”
- SeedTracker algorithm for pattern recognition and track fitting
  - Track finding by successive helix fits
  - Strategy based approach (decoupled from geometry)
  - Not maintained and will be replaced by new tracking code post DBD
  - Limitations:
    - Intrinsic vertex constraint, no tracks for late decays
    - Maximum of one shared hit for different tracks
    - Plain helix fit, no kinks due to scattering

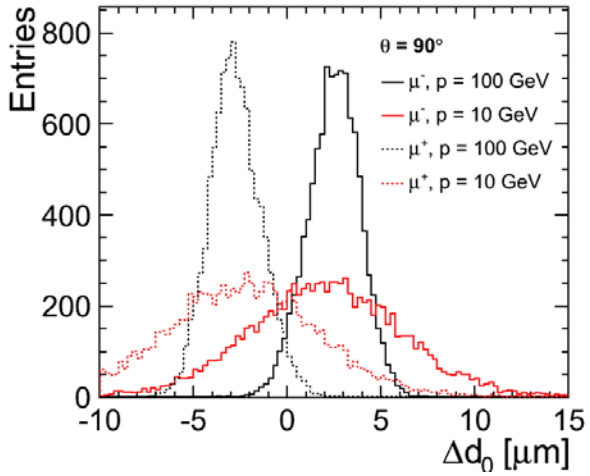
- Several improvements for CLIC CDR concerning reco time
- Finally good performance (~10 minutes per event including overlay)

- Calorimeter assisted tracking can help to find tracks from late decays and backscatters – incompatible with current digitized hits

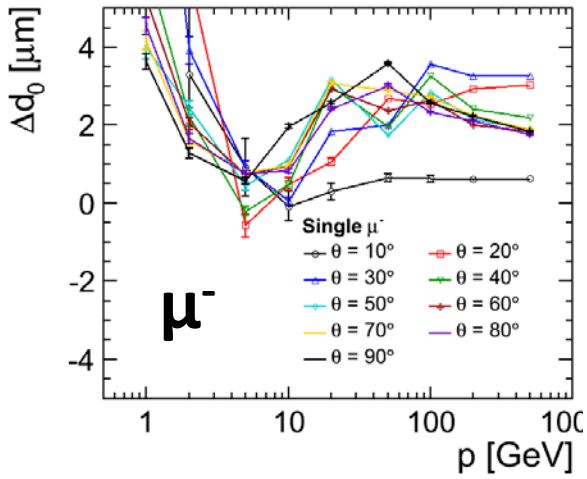
Impact Parameter d_0 Resolution

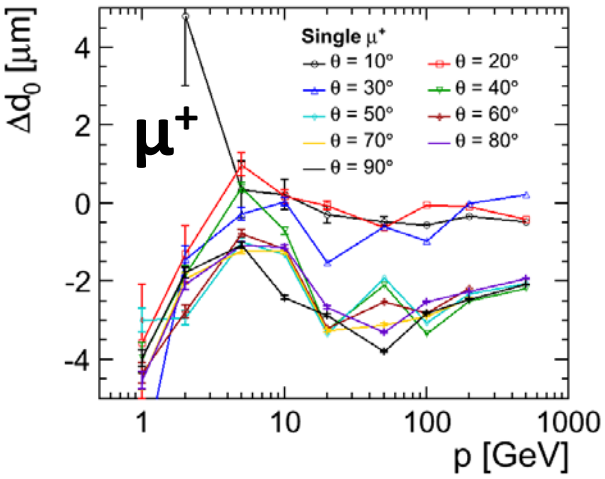
- Resolution as expected
- Gaussian distributions





- Charge dependent bias
- Stronger for low momentum tracks – not significant due to low resolution
- Most significant for central high momentum tracks

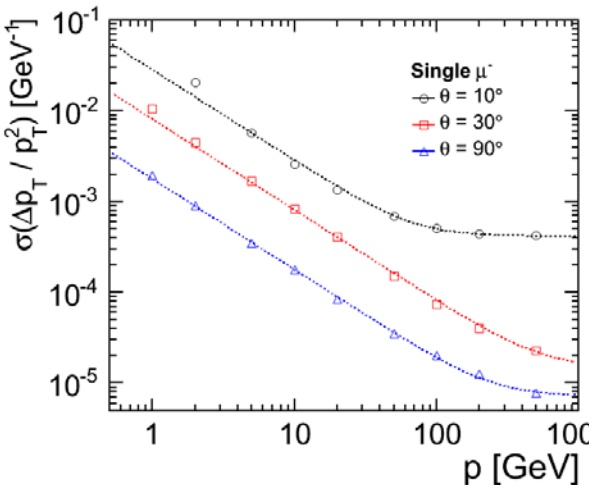


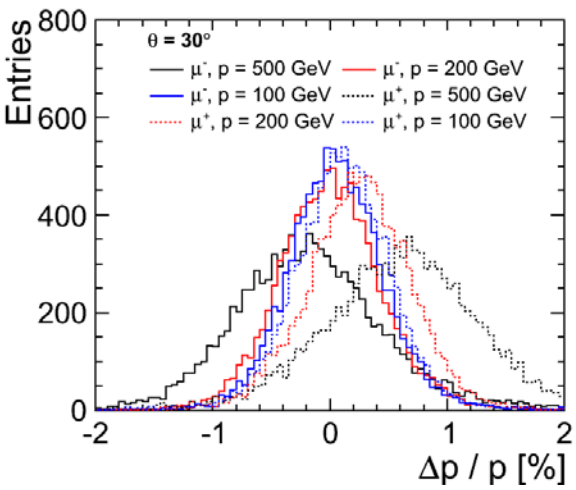


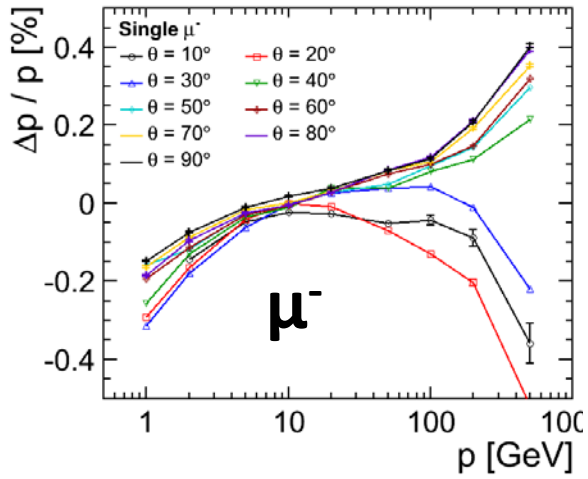
Momentum Resolution

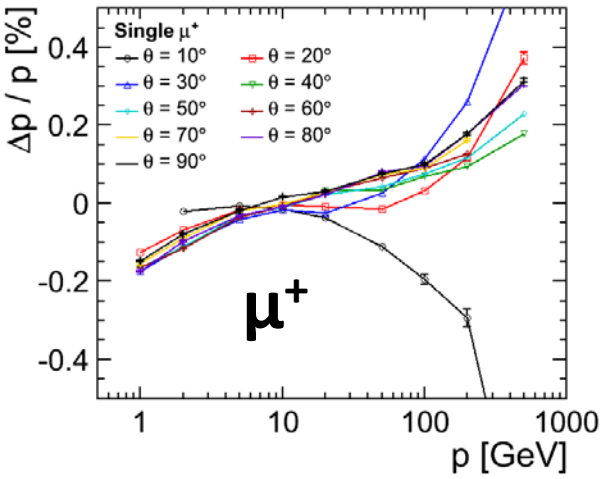
- Resolution as expected
- Gaussian distributions

- Momentum dependent bias in reconstructed p
- Charge dependent bias for forward tracks
- Significant difference only for forward tracks (θ < 30) of very high momenta (p > 100 GeV)









Backup

z_0 Resolution

- Resolution in the tracker barrel limited by the point resolution in z of the strip layers
- If modules “line up” only very low constraints in z
- Less pronounced effect for low pT tracks – not visible for pixel only tracks
- To short lever arm in vertex barrel?