

Tracking efficiency in the presence of pair background

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Motivations - goals

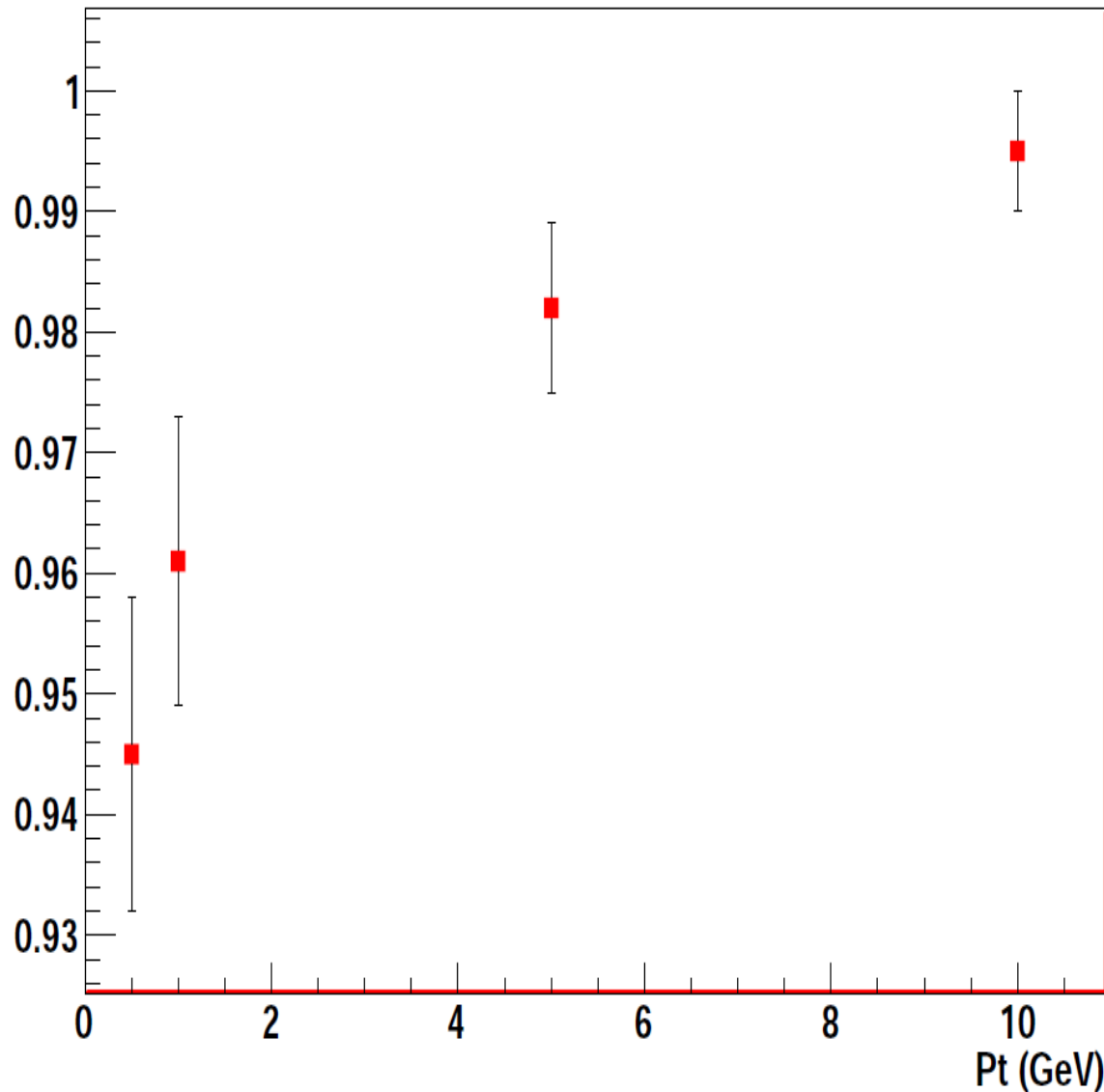
- ILD tracking
 - 1 track segment → TPC
 - 1 track segment → Si detectors
 - Merge the 2 segments
- Tracking at the Silicon detectors
 - When pair bkg is taken into account:
 - The algorithm cannot be highly efficient and performant (time issues)
 - The pattern recognition needs optimisation – modifications
 - Our long term goal
 - ✓ **Have a standalone Si tracking that can cope with beam bkg @ $\sqrt{s} = 1$ TeV**
- Today's presentation
 - **Evaluate the track reconstruction efficiency of the full track with single muons tracks**

Sample

- Single muon tracks at various momenta, covering azimuthal – polar angle
- Sample
 - $P_T > 300$ MeV, at least 10 TPC hits
 - This cut was imposed by the current status of Silicon tracking
 - Track segments reconstructed by Si tracking and by Clupatra at the TPC, and then merged
- The denominator is defined by the TruthTracker
 - Track reco cheater which uses the MC information
- Beam bkg
 - Overlaid G.P. files for $\sqrt{s} = 1$ TeV
 - According to DBD r/o times

Tracking Efficiency

tracking efficiency

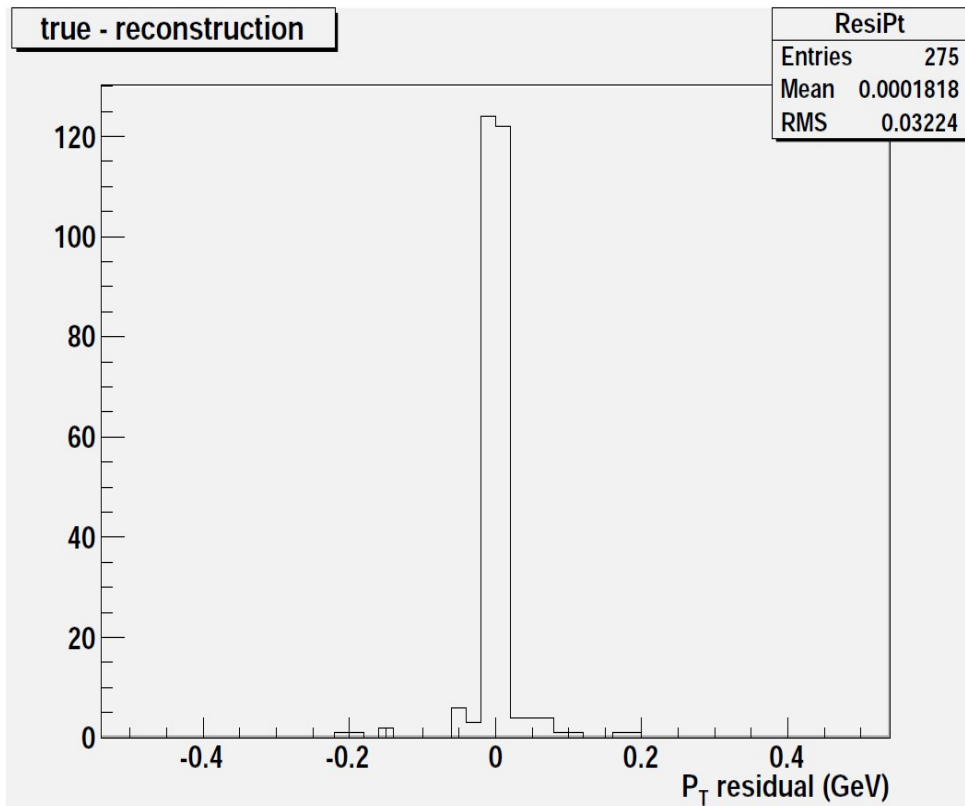


- Quite satisfactory results for high P_T
- For $P_T \leq 1$ GeV efficiency is moderate
- Why we lose tracks?
 - Can't merge Si track segment with TPC track segment or
 - Merge a pair bkg track segment with a phys. Evt one
 - Playing with the merging criteria in order to optimise the procedure

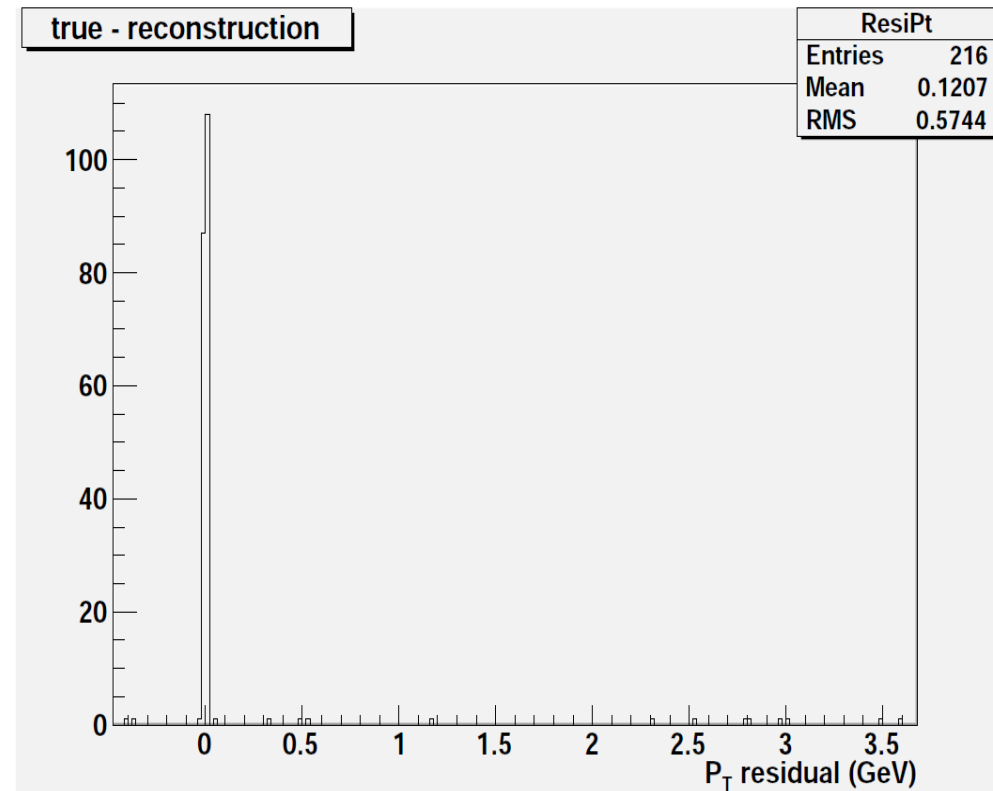
Tracking Efficiency (2)

- But are these tracks reconstructed correctly?
 - Check some P_T residual plots

500 MeV



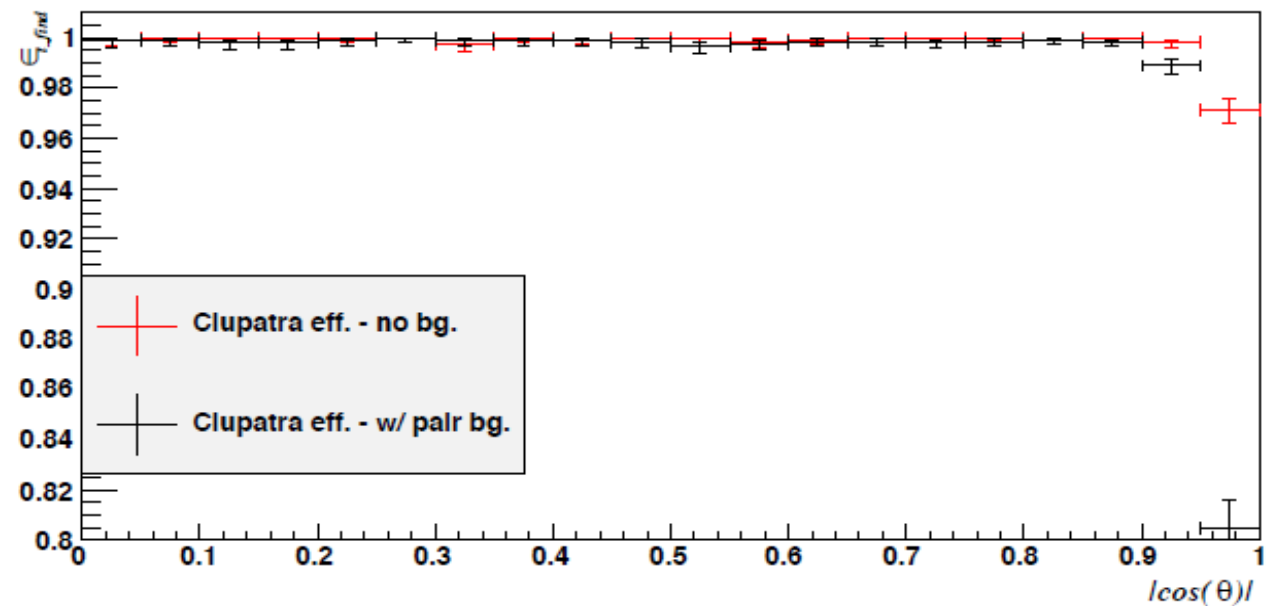
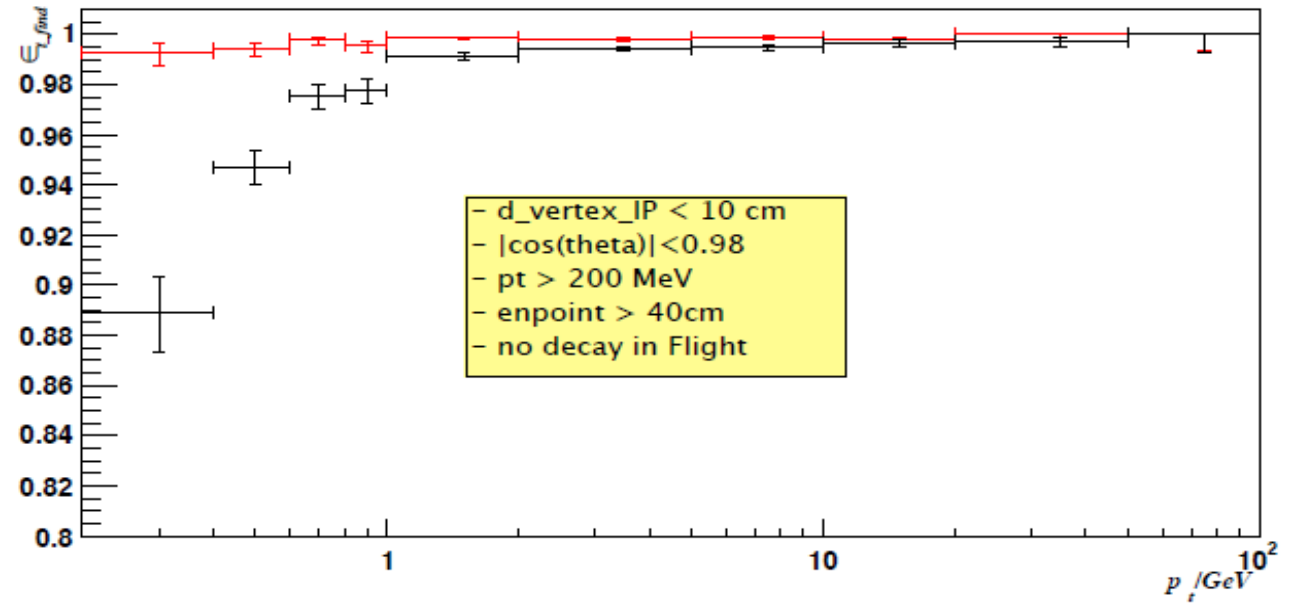
10 GeV



TPC tracking efficiency

- Plots from Frank
- TPC tracks

TPC tracking efficiency - ttbar @ 1 TeV



Summary – Outlook

- Low P_T tracks
 - Moderate efficiency
 - *Should focus on the Silicon tracking optimisation!*
- High P_T tracks
 - Satisfactory results
 - Should check soon physics events (ttbar)
 - **We should crosscheck with ghost track rate!!**
- Make the pulls of the params. to evaluate the track fitting
- Comparison with alternative track reconstruction scheme
 - Track is reconstructed at the TPC and then extrapolated to the Si det.
 - As a backup solution