Recent software activities

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On behalf of ILD software working group

Outline

Documentation

News on

- Generators
- Simulation
- Reconstruction

Towards ILCSoft version v01-17-10

Documentation

Work on-going!

Long term goal to create an ILCSoft workbook

Mid-term

- Provide up to date & well documented steering files for Mokka/DD4hep based reconstruction
- Create a set of reference plots of ILD performance
- Documentation, examples and communication interface (not complete yet!) can be provisionally found for
  - Simulation at http://flcwiki.desy.de/DD4hepLcgeoILD
  - Reconstruction at https://github.com/huonglantran/Documentation/wiki
  - The information will be transferred to the new under construction ILD page

https://confluence.desy.de/display/ILD/ILD+Software+Working+Group

Generators

ILD generator group (M. Berggren & J. Tian) interacts with LCC gen group (T. Barklow (SiD) and P. Roloff (CLIC))

Current emphasis on whizard 2.3 validation as a work-horse for near future mass production

1. Make sure that was done with whizard 1.95 for DBD is reproducible
   - If not, understand why

2. Take advantage of new features

Current status

- **Goal** 1 not yet attained
  - Differences in particle multiplicities in 4-jet evts not understood
  - Possible differences in radiative-return γ spectrum in 2-jet evts
- Working closely with whizard authors to solve above issues
- Other issues (τ polarisation, output format, beam spectrum, pythia interface for hadronisation,…) now ok
- **Goal 2**:
  - Redefine steerings in the new much more flexible whizard 2.3 way well progressing
  - Ameliorated treatment γγ → low pt hadronsdone
  - Beyond – DBD treatment of τ polarisation (transversal) almost well progressing

Simulation

The simulation in the new framework has now been established

ILD model validation check list

- High level place holder agreement, envelope in DD4hep ILD_o1_v05
- Detector dimensions, materials, sensitive dgitisation, step length, cellID
- User will find the available tools on the wiki page
- Accept more as experts or engineers wishes

On going: simulation envelope end engineering place holder agreement

- Experts and engineers help needed

Tracking

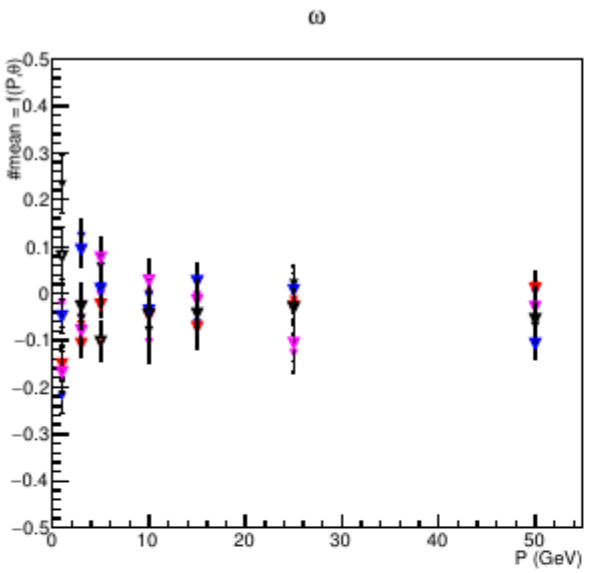
DD4hep / DDKalTest based tracking

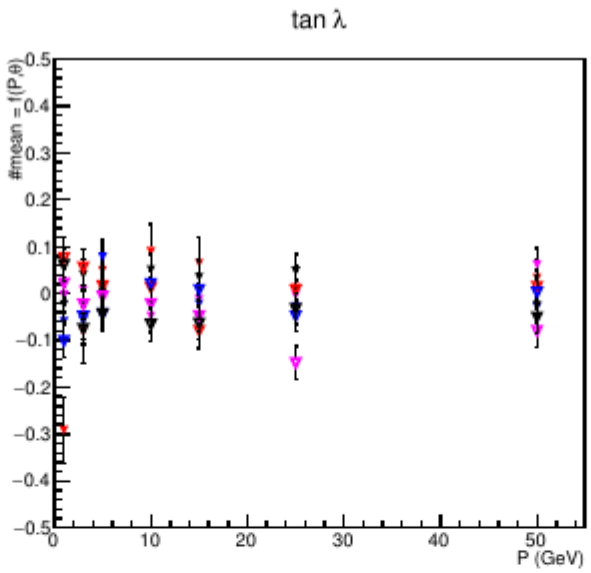
- The ordering of tracking surfaces has been corrected
- Track parameter pulls come out correctly
- Resolutions comparable to DBD
- **Full functionality of the new tracking has been validated!**
- Focus on track finding efficiency – slightly lower in forward region

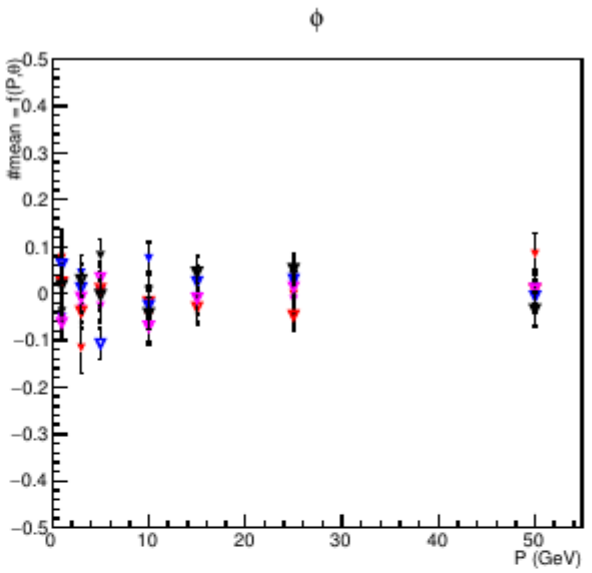
Silicon tracking pattern recognition

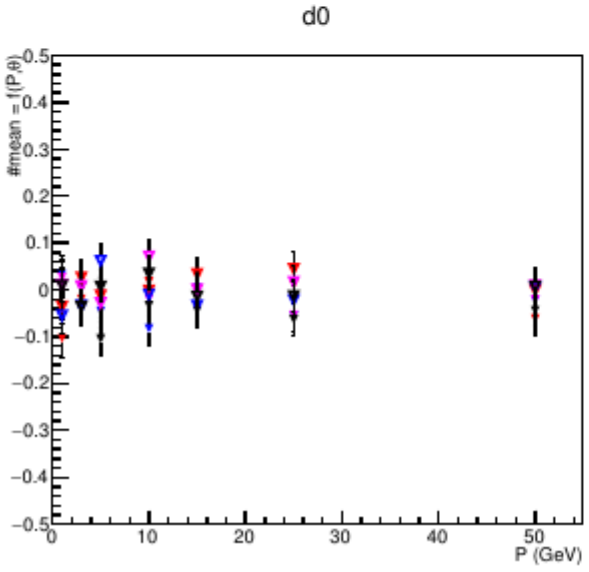
- Mini-vector extended to SIT
  - Trying to make mini vectors out of 1D hits and connect them through the same cellular automaton
  - Possibly alleviate the effect of reconstructing pairs
  - Review the track sorting/selection in order to deal with cases with missing hits

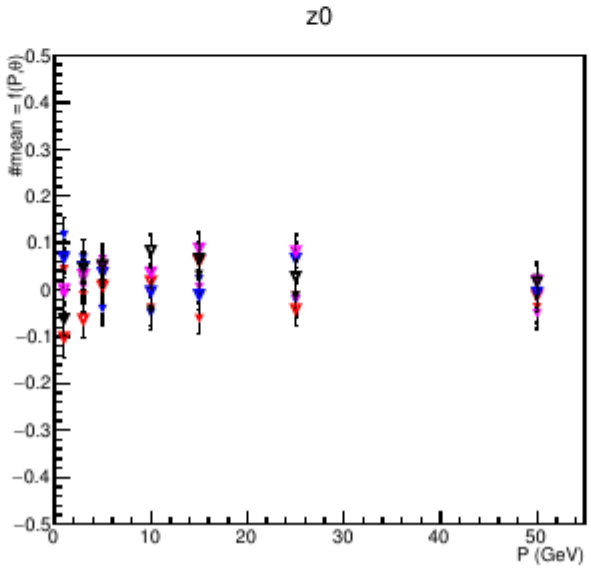
DD4hep vs DBD tracking : Pulls means

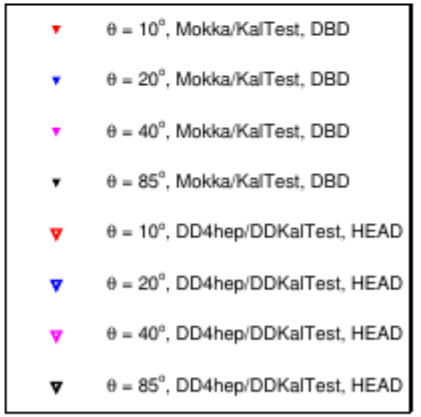




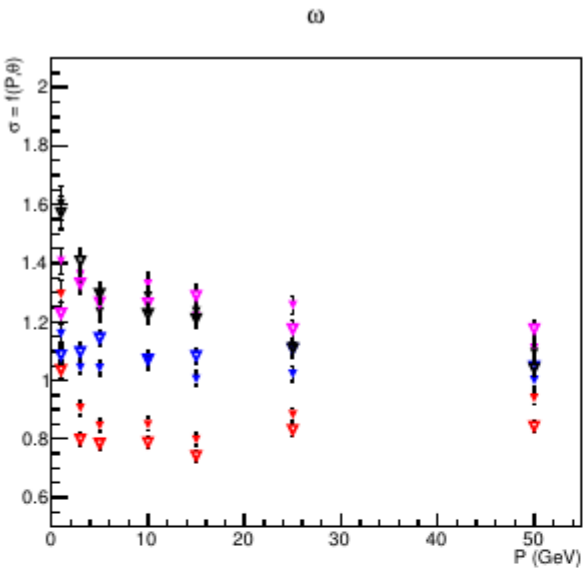


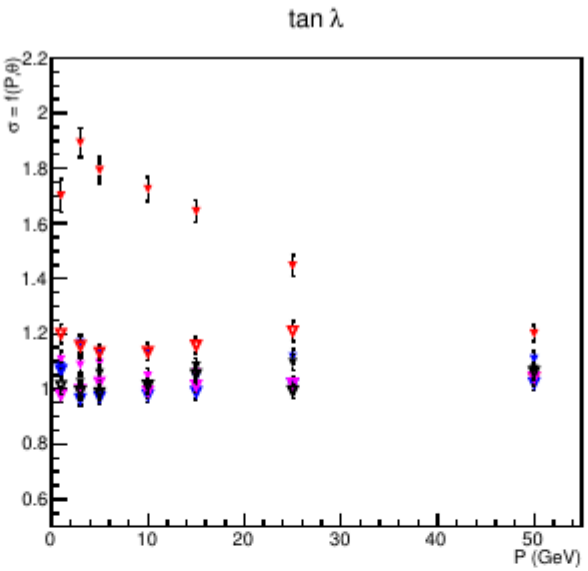


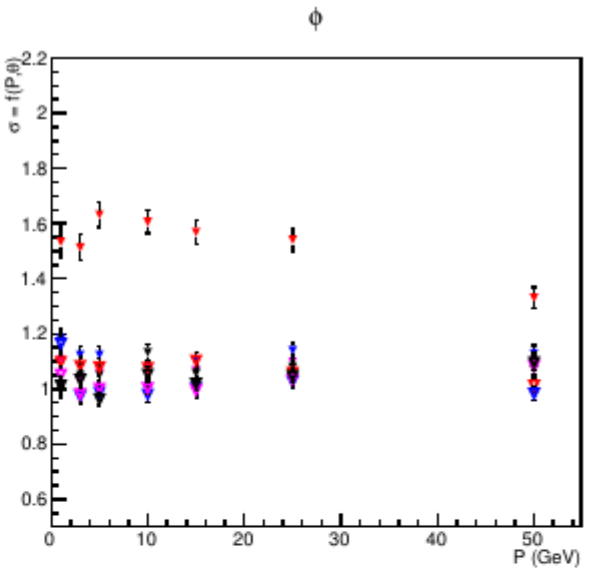


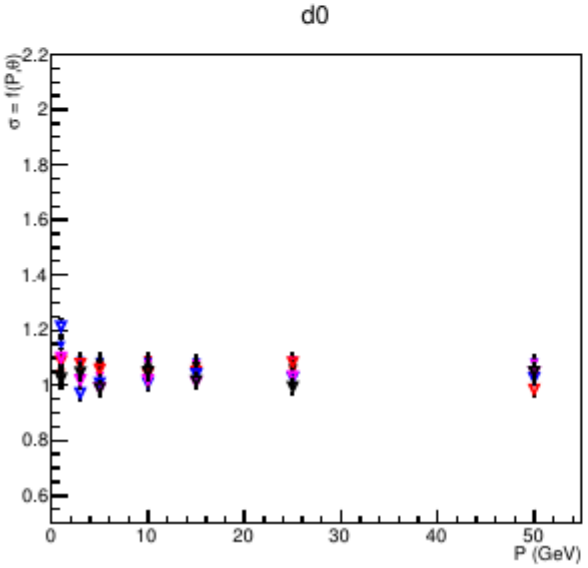


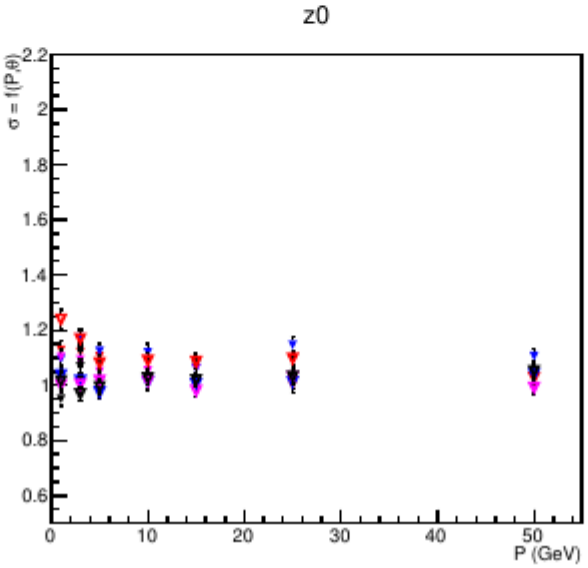
DD4hep vs DBD tracking : Pulls sigmas

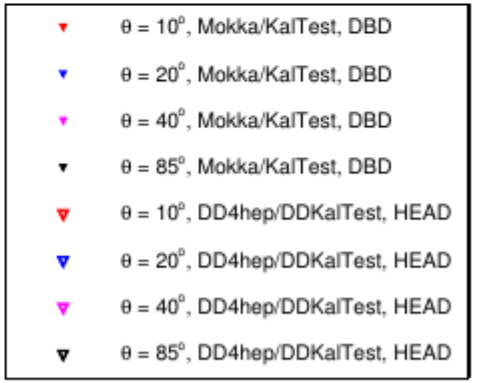




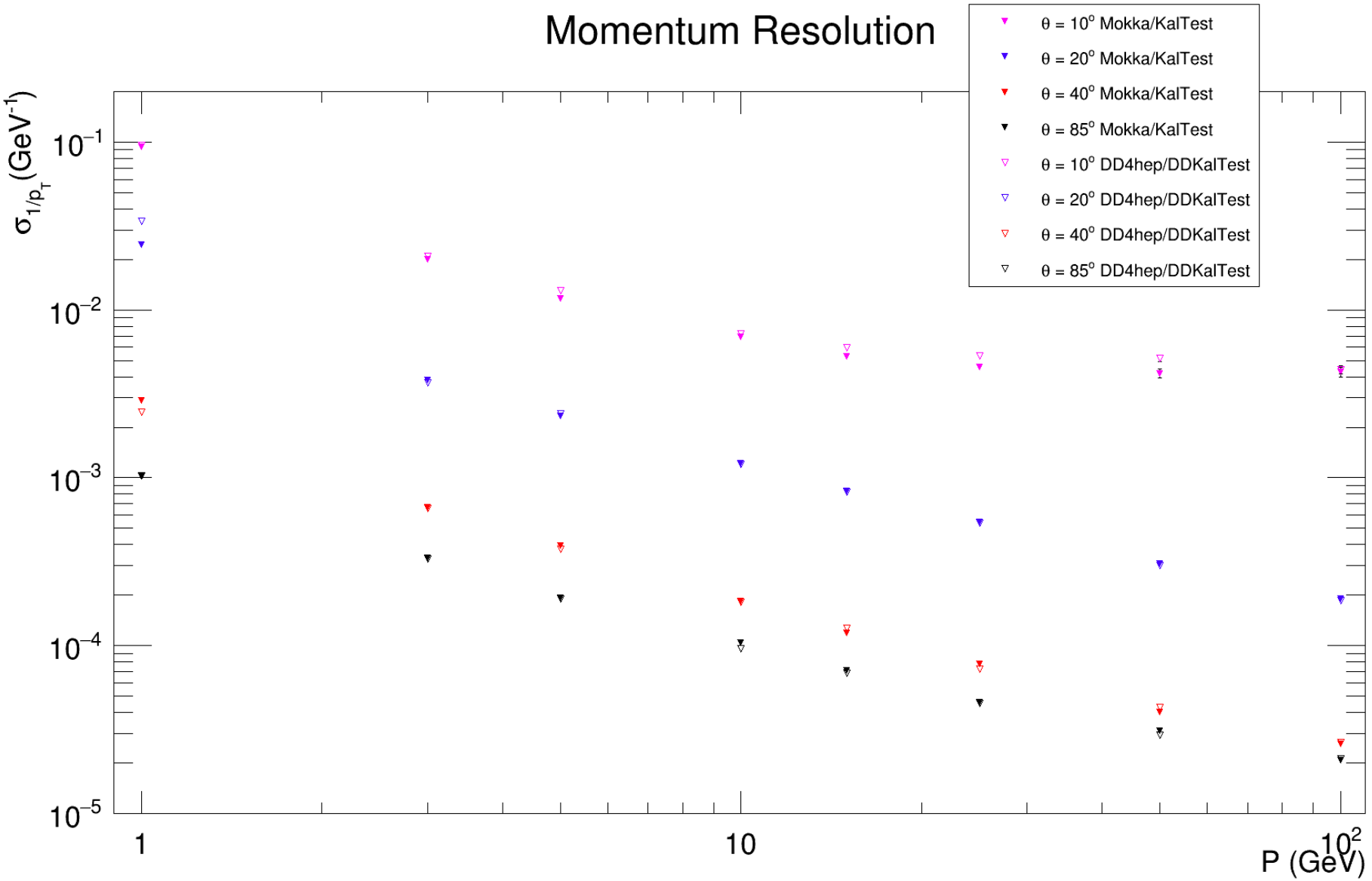




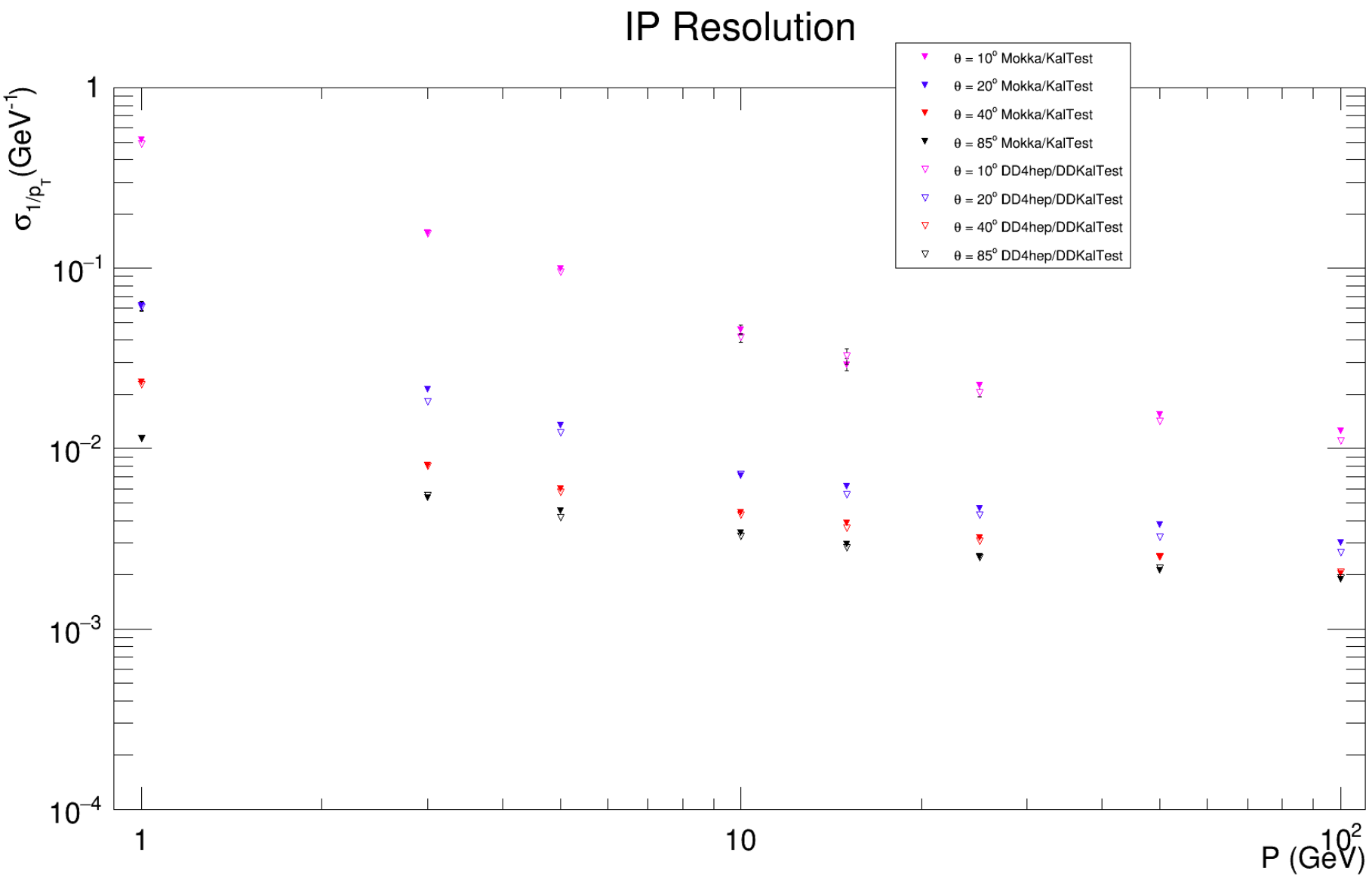




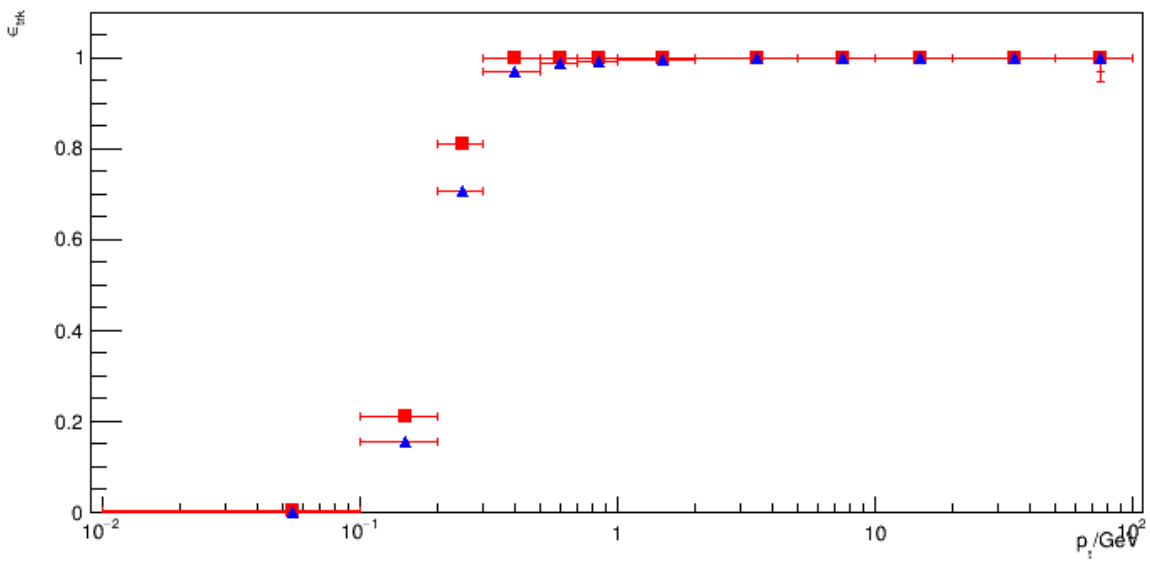
DD4hep vs DBD tracking : Momentum resolution

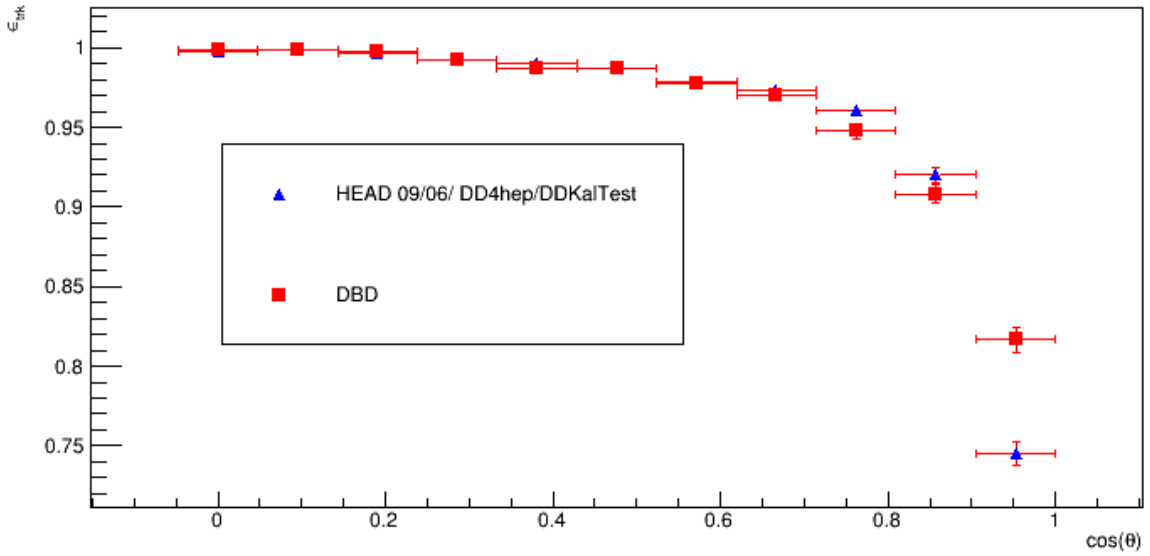


DD4hep vs DBD tracking : Impact parameter resolution



DD4hep vs DBD tracking : efficiency

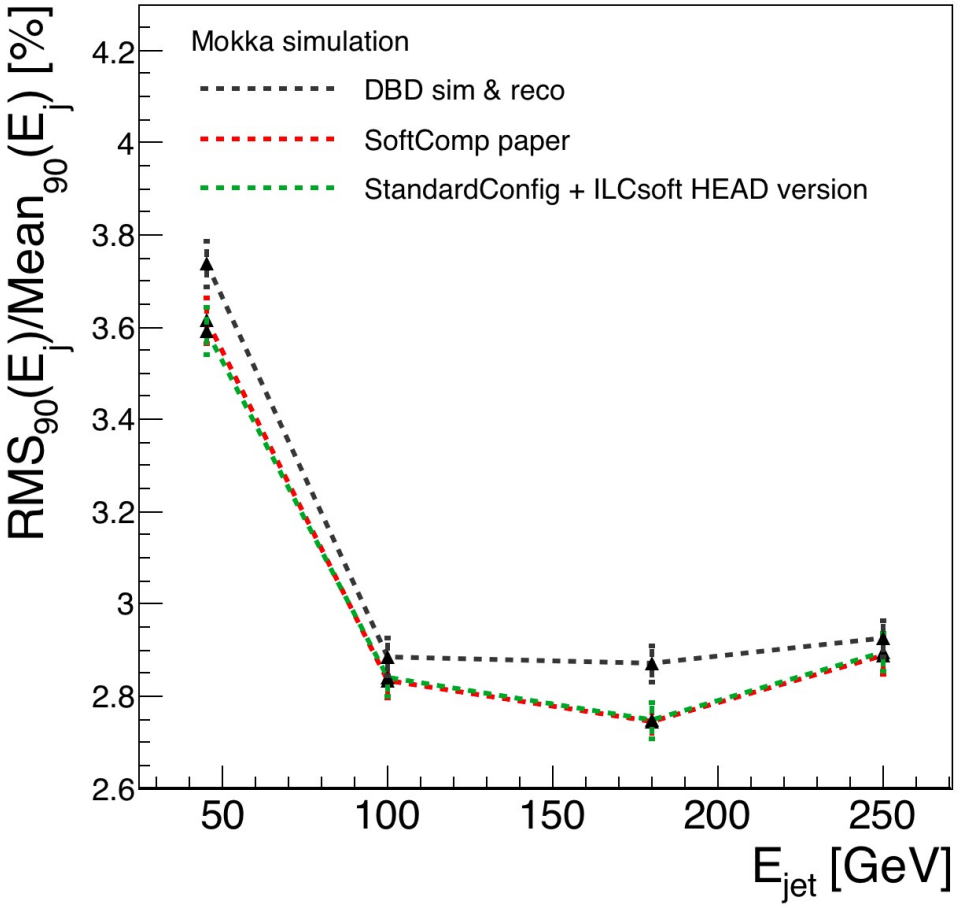




Jet energy resolution status

Comparison on JER between ILCSoft HEAD (9th of June) with DBD

- Software compensation turned on
- Clear improvement in comparison to DBD when software compensation is used
  - Standard steering file has been already updated accordingly
  - Calibration needs some more testing



Towards ilcsoft v01-17-10

Test and validate simulation and reconstruction both for mokka and DD4hep

Mokka based

- Selection of standard VXD digitisation and central silicon tracking
  - Higher efficiency and pair bkg robustness
  - However need to undergo into effort to tune the tools (e.g. flavour tagging BDS to produced track sample)
- Improved JER with software compensation

DD4hep

- Sub detector experts need to have a look at corresponding sub detectors at lcgeo
- Surface based tracking performance similar or better than DBD (*forward tracks efficiency)
- Adapt pattern recognition to dd4hep
- JER needs to be tested
- Full simulation – reconstruction chain to be established

Provide updated steering files for both chains (include HLR tools)