

# Simulation, Reconstruction, Physics sensitivity studies for SiD(Silicon Detector) Brief Report

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## 1 AIM OF THE STUDIES

The main purpose of the project is the Physics sensitivity studies(Higgs physics, top quark Physics, beyond standart model physics) at future ILC(International Linear Collider). The project focused on simulation, reconstruction, physics analysis of Tracking system of the SiD.

## 2 CURRENT PROGRESS

I got acquaint with Physics behind of  $e^+ e^-$  colliders and detector concepts, particularly SiD through literature review. I have gained experience of using new simulation framework DD4HEP based on the GEANT4, which started replacing Mokka. I have got confident with Marlin (reconstruction framework for linear collider experiments). I have obtained skills of analysing data from simulation/reconstruction chain using ROOT(CERN) package. I have done MC(Monte Carlo) Truth Tracking for some of the components of the SiD Tracking system(Tracker Barrel, Vertex Barrel). I have obtained resolutions for momentum and for impact parameter as well as pulls and residuals for 5 track parameters( $\Omega, d_0, \phi_0, z_0, \tan\lambda$ )[1]. Additionally, I have produced residuals for each layer of the Vertex and Tracker barrels, which will help to optimize these components for the best performance. I have obtained efficiency plots for above mentioned components of the Tracking system.

## 3 PLAN

For now focus should be on the finishing MC Truth tracking for all the components of the Tracking system(including Endcaps and Forward Tracking) of the detector. Further, focus will be shifted on the optimization studies(tracker element size) and Pattern recognition(particularly, Conformal Tracking). Finally, I will need to work on PFO(Particle Flow Objects) and get sensitive physics results for precision Higgs Physics.

### 3.1 PRIORITIES

1. Finishing MC Truth Tracking(Residuals, Pulls, Efficiency Plots, Resolution Plots for all the components(Vertex, Tracker Endcaps, Forward Tracker ).
2. Obtain reasonable results for Conformal Tracking.
3. Perform optimization studies

## REFERENCES

- [1] Physics Case for the International Linear Collider Keisuke Fujii, Christophe Grojean, Michael E. Peskin, Tim Barklow, Yuanning Gao, Shinya Kanemura, Hyungdo Kim, Jenny List, Mihoko Nojiri, Maxim Perelstein, Roman Poeschl, Juergen Reuter, Frank Simon, Tomohiko Tanabe, Jaehoon Yu, James D. Wells, Hitoshi Murayama, Hitoshi Yamamoto ILC-NOTE-2015-067 DESY 15-094 KEK Preprint 2015-16 LAL 15-188 MPP-2015-120 SLACPUB16302 June, 2015
- [2] LC-DET-2006-004. Track Parameters in LCIO. Thomas KrÃd'merÃ. 2006-08-10
- [3] Data analysis techniques for high energy physics experiments Bock,Grote,Notz,Regler 1990