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Spring Meeting of the German Physics Society 2016

Particle Flow Calorimetry

- Speaker: Eva Sicking (LAPP/CERN)
- Status: invited
- Abstract: High energy e^+e^- colliders such as the Compact Linear Collider (CLIC) or the International Linear Collider (ILC) are very promising future projects for complementing and extending the LHC physics reach. At these colliders, many interesting physics processes will produce multi-jet final states which can be accompanied by charged leptons and missing momentum. High precision measurements at these colliders pose stringent requirements on the detector performance, in particular on the jet energy resolution ($sigma_E/E<3.5\%$ for 100\,GeV--1\,TeV jets). The Particle Flow approach to calorimetry shows potential to meet the unprecedented demands on the jet energy resolution. It is based on highly granular calorimeters and particle flow analysis, i.e. resolving energy depositions of individual particles by sophisticated algorithms. Over the last decade, particle flow calorimetry was explored by the detector R&D collaborations of the future linear colliders, who built and tested large scale high-granularity calorimeter prototypes and studied the detector and software performance in full detector simulations. This talk describes the principles of particle flow analysis and discusses the advancements in particle flow calorimetry. Recent prototype developments of the CALICE collaboration and results from beam tests and full physics simulations are presented with emphasis on the CLIC physics programme.
- Slides

Simulation of an all silicon tracker for CLIC

- Speaker: Magdalena Münker (CERN, University of Bonn)
- Status: accepted
- Abstract: CLIC is a proposed future electron-positron linear collider with a centre-of-mass energy up to 3TeV. The aim of high precision measurements at CLIC is driving the design of the detector for CLIC. To perform a precise measurement of the Higgs recoil mass a momentum resolution of $\sigma_{p_{T}}/p^{2}_{T} 2 · 10^{-5} GeV^{1}$ is required. This imposes a single point tracking resolution of ~ 7 𝜇m. To reach this aim an all silicon tracker is foreseen for CLIC. A simulation chain has been set up to study the performance of different silicon sensor designs. This simulation chain consists of a GEANT4 simulation to model the energy deposit in silicon, a finite element simulation of the charge drift and signal formation with TCAD and a fast parametric modelling of the front-end electronics. By that energy fluctuations, electronic noise and the digitalisation of the readout signal are taken into account. Furthermore this tool is used to predict the sensor performance in terms of efficiency, cluster-size and resolution. This framework is used to study the performance of e.g. sensors with different pitch and thickness. Various incident angles of charged particles with respect to the sensor surface and the effect of a magnetic field are taken into account. The simulation chain is validated with data.

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