CALICE Detectors

The physics requirements of a future TeV-scale e⁺e⁻ machine such as the International Linear Collider (ILC) demand extremely high performance calorimetry. This is best achieved using a finely segmented system which reconstructs events using the so-called "particle flow" approach.

To demonstrate that the required performance of the calorimeter system can be achieved and that simulations (detector models and underlying physics models used by GEANT4) can reproduce measurements, the CALICE Collaboration is engaged in a co-ordinated series of R&D activities, combining all aspects of calorimetry for such a detector.

The most significant part of this project is a combined testbeam programme. CALICE has developed prototypes of the three main calorimetric subsystems (ECAL, HCAL, tail catcher/muon tracker) of a future detector, and is evaluating the performance of alternative technological solutions within this combined system. Information on each subsystem is given below.

- SCECAL - scintillator / steel ECAL design
- SiW ECAL - a 30 layer silicon tungsten sampling calorimeter, active 9760 channels, 24 X₀ deep, approx. 20 x 20 x 30 cm³
- MAPS ECAL - studies into a novel digital ECAL concept, using 50 micron pixel pitch, the "Tera-pixel" calorimeter
- AHCAL - the analogue HCAL physics prototype, scintillating tiles and SiPMs, 8184 channels, 1m³
- US DHCAL - the digital HCAL, GEM or RPC readout
- SDHCAL - Semi Digital Gas HCAL (GRPC, MICROMEGAS)
- TCMT - Tail Catcher and Muon Tracker