

Luminometers for Future Linear Collider Experiments

The FCAL collaboration develops fast, compact calorimeters to measure the luminosity of electron-positron collisions with high precision using small angle Bhabha scattering, and bunch-by-bunch using beamstrahlung pairs. Searches for new physics also require the detection of high energy electrons at low angles. Several sensor options, such as GaAs or single crystal sapphire, are under consideration in addition to conventional silicon diode sensors, all of which are being assessed for radiation tolerance.

A small Moliere radius facilitates the measurement of Bhabha events in the presence of background and allows the detection of single high energy electrons on top of the diffuse pair background. A multi-plane prototype compact luminometer was studied in a 5 GeV electron beam at DESY. The results for the longitudinal and transverse shower profiles are compared with Geant4 simulations and used to determine the effective Moliere radius of the prototype, which approaches the technological limit.

A multi-channel low-power readout ASIC is under development in 130nm CMOS, comprising an analog front-end and fast 10-bit ADC in each channel, followed by fast serialization and data transmission. In addition, an ASIC with a dual readout scheme for BeamCal allowing for a fast feedback to the accelerator and simultaneous data taking and calibration is under development.

Author: Dr GHENESCU, Veta (Institute of Space Science (RO))

Presenter: Dr GHENESCU, Veta (Institute of Space Science (RO))

Session Classification: Poster Session B

Track Classification: Calorimeters