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Design of readout electronics of scintillators and SiPMs for CEPC ECAL preresearch

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The Circular Electron Positron Collider (CEPC) is a proposing electron positron collider in China which aims for generating a very high center-of-mass energy colliding above 250GeV in where Higgs events are produced with considerable luminosity. The high granularity Electromagnetic Calorimeter (ECAL) is included in calorimeter system which is mainly responsible for the measurement of photon. A Particle Flow Algorithm (PFA) based ECAL solution will utilize about 400k channels /m³.

Here we will present a design of readout electronics based on SPIROC2b for the CEPC ECAL with high granularity scintillants and SiPMs. The readout electronics consists of Front-End-Board (FEB), Data InterFace Board (DIF) and Data Acquisition Board (DAQ). The FEB carries SiPMs (S12571-010P), scintillants (PSD) and front-end ASIC (SPIROC2b). Here we present a simplified version which only include FEB and DIF and tests are based on this simplified version.

Electronic tests, radioactive source X-ray tests and cosmic ray tests were conducted to this system. The results indicate that a charge dynamic from 80fC –300pC @ S/N=4 is successfully achieved and MIPs is separated from pedestal. A 90Sr 2.28MeV electron deposited energy spectrum is also measured by this system. We will also present an electronic calibration method in this design which could automatically calibrate each channels when SPIROC2b do not provide a calibration pin.

Minioral

Yes

Description

SiPM

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