

Development of SPIROC2b-based multi-channel front-end electronics for SiPM array

As an emerging silicon detector, SiPM has the characteristics of high sensitivity, small size, low bias voltage and insensitivity to magnetic field. Widely used in medical imaging, particle detection, light detection and other fields. For PFA-supported calorimeter like ECAL in CEPC, SiPMs often form an array with scintillators to form a dense array of detectors. Therefore, it puts forward low power consumption, high integration, large dynamic range and time measurement capability for readout electronics. In this work, we design and implemented a front-end electronics whose electronics part is integrated with detector part on the same board and which has 144 channels are integrated in the 20cm x 20cm sensitive area. The results of electronic test indicate that the front-end electronics achieved dynamic range from 62fC –300pC for charge and time measurement resolution of 200ps. In addition, a cosmic ray detection experiment was done on this front-end electronics, which successfully separated MIPs from pedestal.

Summary

In this work, a SPIROC2b-based front-end electronics for 144 channels of SiPM readout is designed and implemented. Some electronics and cosmic ray tested have been done and show that the electronics works well.

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