

A Low Noise Readout System for Diamond Microstrip Detectors

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Diamond detectors are suitable for accelerator beam monitor owing to the better radiation hardness compared to silicon detectors. But the smaller deposited energy and larger band gap cause the decrease of signals, which brings difficulties to readout system. In this paper, a low noise electronics based on charge sensitive amplifier (CSA) reading out the signal of diamond microstrip detectors is reported. Up to 40 channels are implemented in the system, each contains a CSA, a CR-RC² shaper, an analog to digital convertor (ADC) and a discriminator for trigger generation. Uploaded data and downloaded commands are transmitted via Ethernet. After calibration and test with a prototype with a size of 300um x 4mm x 4mm, a noise level of less than 845 electrons and a channel linear inconsistency less than 5% are realized in all 40 channels. Furthermore, experimental results with a ⁹⁰Sr source and a laser indicate that the readout system meets the demands of diamond microstrip detectors.

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