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Study of single-slope ADC using FPGA TDC for streaming readout data acquisition

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The shift of data acquisition systems from traditional hardware-triggered ones to streaming readout ones will be mandatory for near-future experiments. We are developing a streaming data acquisition system and have already established it to measure hit arrival time and charge information using FPGA-based TDC and time-over-threshold (TOT). However, charge measurement with TOT has limited performance and is also subject to pulse pileup in high-rate environments. Improving the charge measurement performance is challenging because general waveform digitizer circuits are expensive. One of the low-cost solutions is a single-slope ADC (SS-ADC). SS-ADC is a waveform digitizer consisting of a comparator followed by a TDC. The aim of this paper is to investigate whether SS-ADC can achieve practical performance for nuclear and particle physics experiments. Various situations of signals, slopes, and methods to extract signal features were studied by using simulation and measurements with test boards. The SS-ADC performance found in this study will be presented.

Minioral

Yes

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No

Are you a student?

No

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