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Design, Testing, and Applications of the Fermilab CFD Readout ASIC

Tuesday, 7 November 2023 15:15 (15 minutes)

We present the design and performance of the Fermilab CFD ASIC (FCFD) developed for front-end readout of detectors with fast signals such as LGAD. The FCFD includes a specially designed discriminator that makes its response robust against amplitude variations of the signal. The application of the CFD directly in the readout ASIC promises to be more reliable and reduces the need for complicated and potentially time-dependent calibrations of precision timing detectors during their operation. We present measured performance of the FCFD for input signals generated by internal charge injection, LGAD signals from an infrared laser, and LGAD signals from minimum-ionizing particles. We show that the mean time response is stable for a wide range of signal amplitudes and that the time resolution contributed by the ASIC is less than 10 ps for signals of charge above 20 fC. We will also discuss other potential applications in quantum sensors such as superconducting nanowire detectors.

Early Career

Yes

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