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A Simulation Framework to Optimize Signal Processing for Particle Detectors

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Particle Detectors evolve to ever higher performance, both in terms of sensitivity and channel density. This increases the amount of data to be handled. As transmitting this raw data is often not a viable option, data reduction has to be employed. To achieve this, the individual channel signals are converted, and the data is processed close to the sensor, extracting observable parameters of the signal. Recent developments often rely on low-level, analog blocks and simple digitizers as signal converters, which are tailored to the specific sensor used in the detector. This limits reusability, making a repeated design effort necessary. The design of generic readout electronics based on digital data processing could overcome this issue. In a pursuit to build such a generic detector readout, part of the necessary work is the design of a single channel signal conversion and data handling, both to be used for a wide range of detectors with different sensors. For this, MatLab and Simulink are used to study and evaluate signal and data processing chains. This includes shaping, different digitization approaches (e.g. TDC, ADC) and data processing algorithms. This contribution will describe the models used as input signals for simulations, the architecture of the simulation software, and introduce first algorithm implementations.

Summary

Proceedings

Es soll nicht veröffentlich werden

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