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New developments for data acquisition systems

Thursday 28 November 2024 11:00 (15 minutes)

The aim of this talk is to explore the capabilities of the new CAEN V2730 digitizer, with particular emphasis on the customizable algorithms enabled by the SciCompiler environment. The CAEN V2730 is a state-of-the-art 32-channel, 14-bit, 500 MS/s digitizer designed for high-performance data acquisition and processing, featuring advanced customization options that allow users to tailor its operation for specific experimental requirements. It is based on a high-speed ADC, coupled with a powerful FPGA that provides on-board data processing capabilities, and supports both pulse-height analysis and waveform digitization. Additionally, the V2730 includes multiple programmable I/O channels, USB 3.0 and 1/10 GbE interfaces, as well as a high-speed optical link for data transfer, making it highly adaptable for integration into complex experimental setups.

Using SciCompiler, users can implement sophisticated algorithms for online data analysis, such as custom digital filters, triggering logic, and noise reduction directly on the FPGA, enabling real-time processing and minimizing the need for offline computation. The FPGA resources are accessible through a user-friendly graphical interface, allowing researchers to create and optimize their own algorithms without needing extensive FPGA programming experience. This flexibility allows users to adapt the digitizer's behavior to match the needs of a wide range of applications, including time-of-flight measurements, pulse shape discrimination, and multi-channel coincidence detection.

The discussion in this talk highlight the potential of the CAEN V2730 to revolutionize data acquisition in particle physics by providing researchers with a powerful, flexible platform for developing optimized detection and processing strategies. This talk underscores the value of customizable firmware solutions in advancing detector technology, paving the way for future innovations in real-time data analysis and high-precision measurement systems.

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