

High-Speed Data Acquisition System and Real-time Data Processing using FPGA Architecture

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The superradiant THz sources at TELBE facility is based on the new class of accelerator-driven terahertz (THz) radiation sources that provide high repetition rates up to 13 MHz, and flexibility of tuning the THz pulse form. The THz pulses are used for the excitation of materials of interest, about two orders of magnitude higher than state-of-the-art tabletop sources. Time-resolved experiments can be performed with a time resolution down to 30 femtoseconds (fs) using the novel pulse-resolved Data Acquisition (DAQ) system. However, the increasing demands in improving the flexibility, data throughput, and speed of the DAQ systems motivate the integration of reconfigurable processing units close to the new detectors to accelerate the processing of tens of GigaBytes of data per second. In this poster, we introduce our online ultrafast DAQ system that uses an FPGA architecture for real-time image processing, as well as interfacing the image sensors and provide a continuous data transfer.

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