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High resolution digitization system for the CROSS experiment

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The signal digitization for CROSS, a bolometric experiment searching for neutrinoless double beta decay at LSC (Canfranc Underground Laboratory), will be based on a custom solution comprised of an analog-to-digital board interfaced to an Altera Cyclone V FPGA module. Each analog-to-digital board hosts 12 channels that allow data digitization up to 25 ksp/s per channel and an effective resolution of 21 bits at the typical sample rate required by the experiment (5 ksp/s). The board also allows to digitally select the cut-off frequency of the anti-aliasing filter with 10 bits of resolution from 24 Hz up to 2.5 kHz, as required by pulse-shape discrimination and fast scintillating bolometers. The FPGA is responsible for the synchronization of the analog-to-digital boards and for the data transfer to the storage, using UDP protocol on a standard Ethernet interface. Each FPGA can manage the data coming from 8 boards (96 channels), allowing an excellent scalability. In this contribution we will present a complete overview of the system, a detailed characterization of the system performance, and the results of the first tests with prototypes of the CROSS experiment.

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

N

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