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A multi-channel digitizer board for the BDX experiment

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Due to the lack of results by 'traditional' Dark Matter (DM) searches, the experimental activity extended to search for DM hints at different mass scales, through new experiments performed at accelerators. The Beam Dump eXperiment at Jefferson Laboratory aims to reveal dark matter particles produced in the interaction of an intense electron beam with the beam dump.

The electronic board presented in this work is a 12-channel digitizer oriented to High Energy Physics experiments. The main features are a low cost per channel, compared to equivalent boards, a flexible and high performance timing system, an adequate memory buffer, a versatile front-end circuitry applicable to different sensors, self-triggering algorithms based on waveform analysis.

The board is based on dual ADCs from Texas Instruments; the ADC family members are pin to pin compatible and allow a choice of 12 or 14 resolution bits and maximum sampling frequencies of 250 MHz. Front end sensors can be powered by the board itself with a regulated voltage up to 100 V.

The board accepts clock and timing signals for alignment to a common reference (typically a GPS receiver), relying on a PLL to reduce the input clock jitter. A WhiteRabbit optical interface is also present, as an alternative way to distribute timing.

Data collection and manipulation is accomplished by a commercial System-on-Module mezzanine board based on a Zynq7045 FPGA.

Waveforms passing a programmable threshold are timestamped and forwarded to DAQ for trigger application and event search. DAQ is effectively scalable according to channels number.

Minioral

Yes

Description

DAQ board

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