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The WaveDAQ integrated Trigger and Data Acquisition System for the MEG II experiment

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The MEG II experiment at Paul Scherrer Institut aims at a sensitivity improvement on $\mu \rightarrow e\gamma$ decay by an order of magnitude with respect to the former MEG experiment while keeping the same detection strategy. This is possible thanks to a higher segmentation of all detectors, which improves the resolutions and helps coping with twice muon stopping rate, mandatory to collect the required amount of statistics in three years.

The new WaveDAQ integrated Trigger and DAQ system has been developed to fit within the experiment upgrade, pushing further the performances of the DRS4 Switched Capacitor Digitizer allowing of GigaSample digitisation of all the ~9000 channels in a ad-hoc designed crate system.

The system design is highly scalable and can cover the TDAQ needs ranging from laboratory tests to medium scale experiments, like MEG II.

Each input channel can provide biasing for SiPMs applications and a programmable high bandwidth frontend, removing the need of additional hardware; the trigger generation is fully programmable on a multiple-FPGA architecture interconnected by low latency links and capable of computing charge and time based selections in less than 500 ns.

We report the result of the full system demonstrator used in fall 2019 engineering run with the upgraded MEG II detectors, achieving the requested time resolution and stability and showing the possibility of real-time event selection based on charge measurement.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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