

A flexible data acquisition system for the MEDIPIX family detectors

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We present the development of a configurable data acquisition system for detectors using either the Timepix4 or Medipix4 ASIC as an integrated front-end.

The Timepix4 and Medipix4, developed by the CERN Medipix Collaboration, are 65 nm CMOS ASIC designed for hybrid pixel detectors for medical and particle physics applications.

We will describe fully customizable system based on commercial hardware and standard communication protocols allowing for high reusability in different projects.

Customization is provided by an open-source fully configurable firmware and a software.

The system is based on a AMD/Xilinx KCU105 development kit and uses a standard VITA 57.1 connector as interface to the detector.

This allows for reliable connection while exploiting a maximum input bandwidth of up to 80Gbps coming from the ASICs.

The use of HDL on git (Hog) features allows for an easy configuration of the modules to be instantiated in the FPGA fabric allowing user full flexibility on the peripherals to be used.

The DAQ configuration is performed using a dedicated 1G ethernet connection implementing the IPbus protocol.

Partial reconfiguration regions may be used for fully customizable on-line data-reduction methods allowing to read back data using two 10G ethernet connections implementing the downstream data-path.

This approach has many hidden challenges both on the technical and distribution level discussed in the presentation.

Collaboration

Role of Submitter

I am the presenter

Primary authors: COTTA RAMUSINO, Angelo (Istituto Nazionale di Fisica Nucleare); ROMOLINI, Gabriele (Istituto Nazionale di Fisica Nucleare); ALOZY, Jerome (CERN); FIORINI, Massimiliano (Università di Ferrara / INFN); CAMPBELL, Michael (CERN); BIESUZ, Nicolò Vladi (INFN - Ferrara); BOLZONELLA, Riccardo (INFN - Ferrara); CAVALLINI, Viola (Istituto Nazionale di Fisica Nucleare); LLOPART, Xavier (CERN)

Presenter: BIESUZ, Nicolò Vladi (INFN - Ferrara)

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