

A compact size, 64-channel, 80 MSPS, 14-bit dynamic range ADC module for the PANDA Electromagnetic Calorimeter

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A compact size, 64-channel, 80 MSPS, 14-bit dynamic range ADC modules for the scintillating electromagnetic calorimeter of PANDA were developed and used for testing in various detector readout set-ups [1]. To minimize cabling bulk, the modules are planned to be placed inside of the PANDA detector volume, where they will be exposed to magnetic field of 2T and a non-negligible radiation flux. The module performs signal filtration, extracts important signal parameters and allows for resolving and parametrizing overlapping pulses. A dual FPGA structure and a hardwired arbitration circuit allows for resolving potentially catastrophic situations caused by radiation-induced (SEU) configuration damages. The FPGAs are prepared for self-detection and recovery from SEU. Processed data are pushed to the optical link running at 2 Gbit/s. The ADC module is compliant with a “Synchronization Of Data Acquisition” (SODA) System, which allows for obtaining defined latencies with a reference time accuracy of 50 ps [2]. The paper describes construction details and test environments. The results of performance test, including dynamic range, linearity, magnetic field and preliminary radiation sustainability are also presented.

Primary author: Dr MARCINIEWSKI, Pawel (Uppsala University)

Presenter: Dr MARCINIEWSKI, Pawel (Uppsala University)

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