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The front-end electronics of the CLAS12-RICH detector

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The new aerogel radiator hybrid geometry CLAS12 RICH detector will be readout using 25000 single photon sensitive pixels on a 1 m² surface.

A modular on-detector electronics has been developed based on ASIC and FPGA.

It is capable of 100 % detection efficiency at 50 fC and 3D-binary reconstruction (hit position and time) with 1 ns resolution, 8 μ s latency and negligible dead time up to 100 kHz.

In addition the system can work in self-trigger mode, offers linear analog measurements up to 30 pC thanks to embedded ramp ADCs and has an adjustable amplitude test pulser for complete onsite calibration and monitoring.

Boards are tailored to fit exactly Hamamatsu H8500 dimensions and come in two variants, 128 and 192 channels, to tessellate large surfaces or serving small setups with a very compact and lightweight look.

A user-friendly optical ethernet interface is available for high speed data transfer to the acquisition node.

The high configurability, the modular approach and the optical interface make it potentially interesting for many different imaging applications.

Stand alone test, laser test, irradiation test and real working conditions test results will be presented together with the system design.

Registered

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