TRBv3 - FPGA based, universal readout board for physics experiments

Grzegorz Korcyl[(a)]

[(a)] Jagiellonian University

Most of the physics experiments involving charged particle identification require precise time measurements. The rising requirements concerning the time resolution, the channel density, the accepted hit rate and finally the price per channel, force the development of new and versatile solutions which can be used in many applications. In order to meet these requirements, a Time to Digital Converter (TDC) module realized in FPGAs [1] with integrated DAQ has been developed, produced and is currently under tests[2]. High time resolution of less than 14 ps RMS and a high channel density (256) allow to efficiently measure the time of flight of particles, being applicable for detectors like RPCs, scintillation counters with PMT readout or STTs. Together with the implemented network functionality, the module can serve as a standalone measurement device or as a part of a larger DAQ system. Optical links provide all the connectivity features needed in order to transfer data out to the event builders as well as for slow control purpose. Its functionality can be additionally extended by connecting one AddOn-PCB or four Small AddOn-PCBs which can introduce different connection types or measurement devices.

[1] Bayer, E.; Traxler, M.; "A High-Resolution (RMS) 48-Channel Time-to-Digital Converter (TDC) Implemented in a Field Programmable Gate Array (FPGA)", doi:10.1109/TNS.2011.2141684

[2] M. Traxler; E. Bayer; M. Kajetanowicz; G. Korcyl; L. Maier; J. Michel; M. Palka; C. Ugurg; "A compact system for high precision time measurements (¡ 14 ps RMS) and integrated data acquisition for a large number of channels", doi:10.1088/1748-0221/6/12/C12004

E-mail: grzegorz.korcyl@uj.edu.pl