

A multipurpose Trigger Readout Board

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The concept of a general purpose Trigger Readout Board (TRB) had its source in the future needs of the HADES (High Acceptance Di-Electron Spectrometer). The HADES is a running experiment, installed at the SIS-18 synchrotron (GSI, Germany). Next years HADES will be moved to the upcoming FAIR accelerator complex. Here, HADES-at-FAIR will continue its experimental program. Due to mentioned plans, the detector and Data Acquisition System (DAQ) undergoes an upgrade. The main purpose of the HADES DAQ upgrade project is to achieve a primary data acquisition rate of 20 kHz (100 kHz) with high (low) occupancy. We preferred a modular design to increment the possible set of applications, which also simplified the debugging phase, and made easier the integration of additional detector systems.

To fulfill all requirements and to provide fast preprocessing for the different trigger levels, the Trigger Readout Board was built. TRB is a major part of the new DAQ system, it serves as a platform for all other subsystems. It is featuring a fast optical link (2.5 Gb/s), Tiger-Shark DSP (600 MHz), 2 Gb SDRAM and ETRAX-FS multi-processor. The board has also 128 Time to Digital Converter (TDC) electronic channels based on the HPTDC from CERN. The architecture of the chip allows to set measurement parameters. In high (very high) resolution mode it has intrinsic resolution of 34 ps (17ps). In this talk the performance, under realistic conditions, of the TRB will be presented. Good example of working system is newly installed RPC detector. Average time resolution reached for the whole detector is 70 ps. To broaden the spectrum of possible applications in the future DAQ-systems, we added a very high data-rate digital interface connector to this board (15 Gbit/s). It gives the possibility to mount an add-on board to the TRB. The add-on boards then provide the detector-specific interfaces (special connectors) or FEE (like ADCs) and additional computing resources (FPGAs). To show all possible applications of this board also add-on boards will be described.

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