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The GANDALF Framework: Readout and Trigger System for the CAMERA detector at COMPASS II

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To measure Deeply Virtual Compton Scattering cross sections the detection of recoil protons is mandatory. Therefore the CAMERA detector was developed for COMPASS II at CERN, consisting of two layers of concentric arranged scintillating slats, surrounding a liquid hydrogen target. The detector design allows for reconstruction of track and energy deposition of recoiled protons, using Time-Of-Flight together with amplitude information from photomultipliers. The signals from 96 channels cover a dynamic range from 0V to -4V, have a rise-time of 3ns and its time information needs to be obtained with a resolution of 200ps to meet the requirements for the track reconstructions. The GANDALF Framework consists of an electronic readout system, based on VXS/VME64x modules, which allow for digitizing the detector signals at 1GS/s at a resolution of 12bit. In real-time, the data is processed by a Virtex-5 FPGA, calculating time and amplitude of the signals. From up to 18 sampling ADC boards, corresponding to 144 ADC channels, this information is streamed to a single central proton trigger unit, the Tiger module. Here a Virtex-6 SXT FPGA calculates geometric pattern and time coincidences of the detector signals. By this step recoil protons are identified in real time [2]. A second TIGER module is used for the distribution of the experiment wide clock beat and the first level trigger signals. The same module collects time stamps, signal amplitudes and integrals, compiles event information and acts as a readout driver module for the data acquisition system. In this talk an overview of the readout and trigger system for the CAMERA detector and the performance of the GANDALF Framework will be explained and results of the 2012 pilot run at COMPASS II will be presented

Collaboration

On behalf of the COMPASS II collaboration

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