

A Digital Trigger for the Electromagnetic Calorimeter at the COMPASS Experiment

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The COMPASS experiment at CERN-SPS performed during the 2009 run a measurement of the Primakoff effect. This effect is characterized by high energetic photons in forward direction, which due to a very small angle respectively to the incident beam direction hit only the Electromagnetic Calorimeter in the second spectrometer stage (ECAL2). In order to efficiently detect those events the ECAL2 digital trigger system was developed. The trigger logic was integrated into the existing readout electronics, taking advantage of the flexible FPGA based sampling ADC modules, employed in the COMPASS experiment. The logic combined 512 calorimeter cells and calculated the total energy at every point of time on a basis of extracted signal amplitudes and temporal information. The single channel time resolution was measured to be in the order of 1 ns. The digital realization of the trigger logic allows to correct the time as well as the energy response of every calorimeter channel, and to monitor the system parameters. For the Primakoff run the trigger logic was configured to process 132 central calorimeter cells to identify events where the energy exceeds 50 GeV/c and 70 GeV/c. The 50 GeV/c trigger was prescaled by a factor of 2 while all events with more than 70 GeV/c were acquired. The total trigger rate was about 30 kHz.

In this talk the functionality of the system as well as the system performance during the Primakoff run in 2009 will be presented.

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