

DAQ for High Energy Cosmic Rays Detection

Abstract content

We will describe a custom-made data acquisition system to sample the photomultiplier signal from Water Cherenkov radiation detectors at 100MSPS based on FPGA to evaluate their performance, and to measure parameters of our interest like rate, trace and more; which is easy to build, low cost and portable. We will present measurements of these detectors, and presents algorithms described in hardware language that once compiled constitute the firmware for DAQ.

Summary

We describe in detail the new electronics and data acquisition system based on FPGA boards of the Extensive Air Shower detector array built in the Campus of the University of Puebla to replace the old traditional data capture system. Normally, a control room of the EAS is based on the DAQ system on commercial CAMAC and NIM electronics modules in combination with several digital oscilloscopes to capture and process the signals from the PMTs of the Water Cherenkov and liquid scintillator detectors. Modern electronics based on-chip fast analog to digital converters and powerful digital processors are ideal to be the basis of custom-made DAQ systems which are more flexible, faster and cheaper than the traditional DAQ systems based on modular electronics. One Advantage using this kind of electronics is: i.e. discriminating the PMT signals inside FPGAs with respect to the conventional use of dedicated discrimination circuits. The DAQ sends data to a local computer for storage and later analysis. The binary file includes information on pulse size and GPS time for signals from each event, or other kind of information.

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