

The Data Acquisition System of the MAGIC-II Telescope

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The MAGIC telescope is the world's largest gamma ray telescope, designed to look at the light emitted by air shower by Cherenkov effect. It is operating since 2004 at the Roque de Los Muchachos observatory, La Palma, Canary islands. MAGIC-II is the upgrade of the project, consisting of a twin telescope frame with innovative features like new photon detectors to lower the threshold energy further and an ultrafast signal sampling to reduce the effect of the diffuse night sky background. The new acquisition system is based upon a low power analog sampler (Domino Ring Sampler) with frequency ranging from 1.5 to 4.5 GHz and data are digitized with a 12 bit resolution ADC. The analog sampler, originally designed for the MEG experiment, has been successfully tested on site and showed a very good linearity and single photon discrimination capability. Data management are performed by 9U VME digital boards called PULSAR (PULser And Recorder) which handle the data compression and reformatting as well. Every board has 32 analog channels plus auxiliary digital signals for trigger and monitor purposes. For a kHz trigger rate and a 2 GHz frequency sampling, the data throughput can be as high as 100MB/s thus being a challenge for modern data transmission and storage solutions. The data are transferred to PCI memory via Gbit optical links using the CERN S-Link protocol and to the mass storage system. The Data Acquisition system design is described in detail.

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