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New Electronics for the Cherenkov Telescope Array

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The European astroparticle physics community aims to design and build the next generation array of Imaging Atmospheric Cherenkov Telescopes (IACTs), that will benefit from the experience of the existing H.E.S.S. and MAGIC detectors and further expand the very-high energy astronomy domain.

In order to gain an order of magnitude in sensitivity in the 10 GeV to > 100 TeV range, the Cherenkov Telescope Array (CTA) will employ 50-100 mirrors of various sizes equipped with 1000 to 4000 channels per camera, to be compared with the 6000 channels of the final H.E.S.S. array.

A 3-year programme started in 2009 and financed by the French ANR (Agence nationale de la Recherche) aims at building and testing a demonstrator module of a generic CTA camera. We present here the NECTAr design of front-end electronics for the CTA, adapted to the trigger and data acquisition of a large array, with simple production and maintenance operations.

Cost and camera performances are optimised by maximising the integration of the front-end electronics (the amplifiers, fast analogue samplers, ADCs and first level buffering) in an ASIC, achieving several G-samples/s and a few microseconds eadout dead time. We present preliminary results and extrapolated performances from Monte Carlo simulations.

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plenary

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