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Design of the front-end digitization electronics for a G-APD-based Cherenkov telescope camera

A camera for ground-based based Cherenkov astronomy using Geiger-mode Avalanche Photodiodes (GAPD) was developed within the FACT project (First G-APD Cherenkov Telescope). Its essential design components are solid light concentrators to make full use of the large angular acceptance of G-APDs and camera-integated digitizaton and trigger electronics. Data transfer from the camera to the counting house uses Ethernet fibres.

The digitization employs custom-developed boards, with 36 channels each, integrating four DRS4 analog pipeline chips. The sampling frequency will be 2 GHz, digitization at 30 MHz. Custom-developed preamplifier boards are connected to the digitizers via a mid-plane connector board. In total, FACT will use 40 digitizer and 40 preamlifier boards, arranged in four crates. In total, the camera has 1440 channels.

This presentation will cover the detailed design of the preamplifier and digitizer boards, and the data read-out procedure over Ethernet. The calibration method of the DRS4 chips will be discussed, as well as performance results from the serial board production.

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