

18 Electronics Workshop

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Besides small repair jobs and prototype tests, performed upon request, we'd like to mention a selection of our activities here.

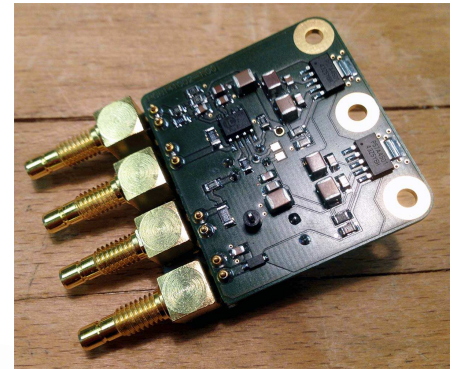
For the XENON1T experiment several PMT bases were designed and produced. Preparations for a larger scale production are underway, as well as the design and construction of a differential instrumentation amplifier for pressure gauges.

For XENON an LED/laser pulse driver with short pulse times was designed and built, to be used for calibrations.

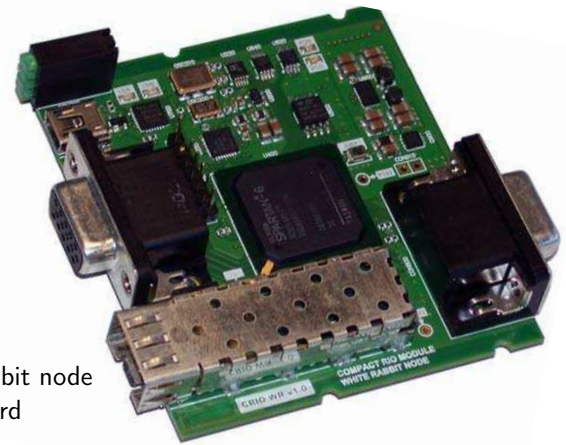
A White Rabbit node, compatible with the National Instruments CompactRIO system, was designed and produced. White Rabbit (WR) is an Open Hardware project initiated by CERN and GSI. Its main task is to transmit accurate timing information to synchronize distributed hardware on a ns scale via standard optical fiber over distances of up to 10 km. Within this project, the Physik-Institut is responsible for development of a WR end node which is compatible with the CompactRIO framework from National Instruments (NI). Several prototypes were successfully commissioned in house and duplicated by CERN for upcoming compliance tests performed by NI. We designed and manufactured a universal converter with five LVDS-CMOS/CMOS-LVDS translators each. Being part of the Open Hardware project, the design including the documentation was published on the White Rabbit Wiki webpages.

For the Flashcam camera for the CTA observatory, a camera safety system has been designed and commissioned, including:

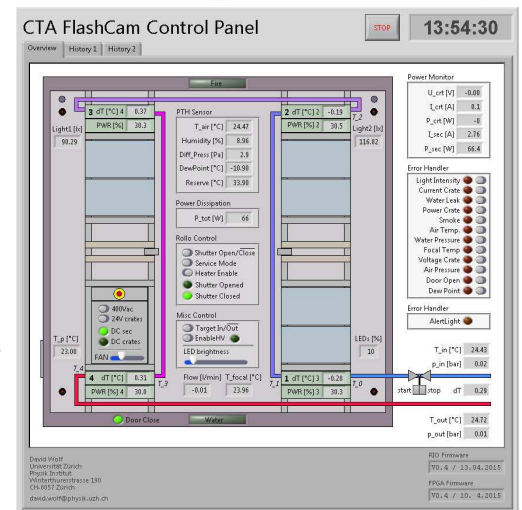
- evaluation and testing of individual components
- planning and documenting the wiring harness
- wiring of the control cabinet and the connected environmental sensors
- development and prototyping of custom made sensors and actuators
- development of a first software version (based on LabVIEW) for initial in-house tests



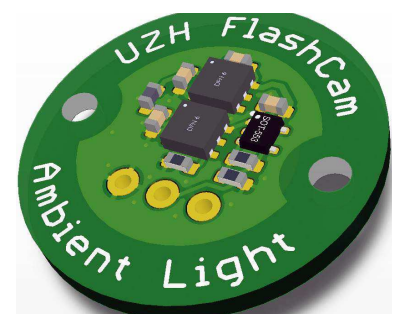
- Pulse driver circuit board



- White Rabbit node circuit board



- Graphical user interface for FlashCam safety control



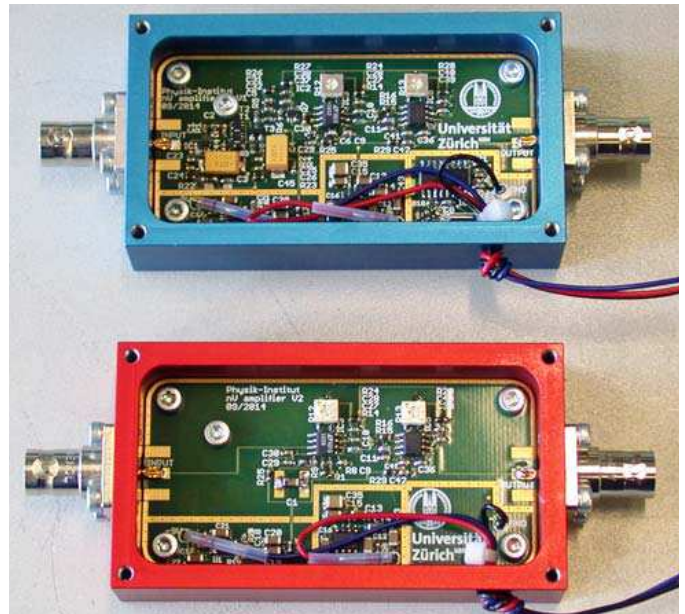
- FlashCam ambient light sensor

Within the CTA consortium, the Cherenkov telescope array requires alignment of 220 mirror segments in each Large Size Telescope (LST). In cooperation with the Institute for Cosmic Ray Research (ICRR) at the University of Tokyo, 220 actuator sets were produced in industry under supervision of the Physik-Institut. Final commissioning and acceptance testing was done in-house.



- Series production of CTA mirror actuators

For the Schilling group two ultra-low-noise DC instrumentation amplifiers were developed, to be used for measurements of small resistance variations. The two amplifiers, each with a gain of +1000 but with slightly different design philosophies, were both able to reach noise levels below 5 nV rms at a bandwidth of 1 Hz.



- Ultra-low noise nV amplifiers

During the repair and modifications of a variac used in a laboratory setup of Fink's group, several state-of-the-art upgrades enhancing personal safety were introduced. A dedicated xyz-amplifier was designed to limit the field of view of a scanning tunnel microscope. It allows for switching the field size in powers of 1/2 (1/2 to 1/128) while matching the required voltage offset required by the following piezo driver stage.

- Circuit board of the xyz-amplifier

