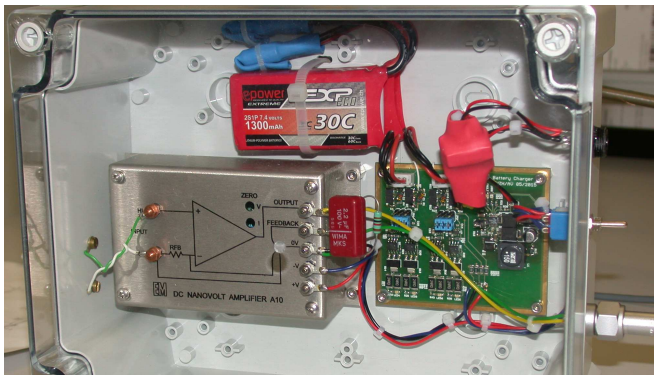
18 Electronics Workshop

D. Florin, A. Vollhardt and D. Wolf

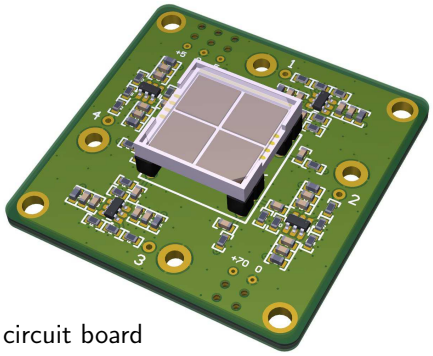
Besides maintenance work for the existing laboratory infrastructure and small-scale prototype designs, the electronics workshop contributed to the following projects.

For the group of Prof. Chang, a low-noise floating power supply was designed and built. Featuring state-of-the-art Lithium-polymer accumulators, the design has a significantly reduced mass and size compared to conventional solutions based on lead-acid batteries.



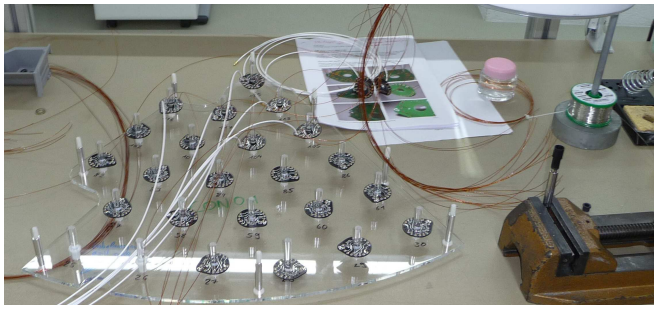
- Battery power supply for nanovolt amplifier

The readout of a multi-pixel photon counter (MPPC) required a dedicated four-channel preamplifier (group of Prof. Baudis) which was designed and assembled in the workshop. Key features of this amplifier are its compactness and low power consumption while preserving the fast rise time of the original detector signal.



- MPPC preamplifier circuit board

Another project for this group involved the organization of the mass production of photomultiplier base circuit boards and their cabling.



- Production of PMT bases

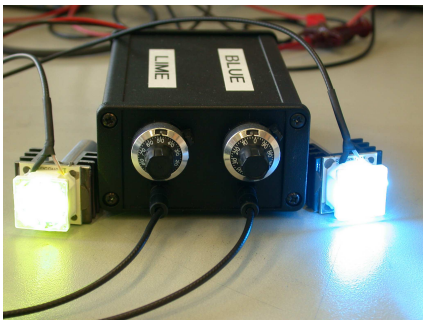
The UHV chamber of the group of Prof. Greber required a new RF generator for creating a plasma for cleaning purposes. The electronics workshop took care of design and construction of the 13.56 MHz signal exciter and purchasing/commissioning of the required RF power amplifiers and impedance matching units. Special attention was paid to the long duration of the required plasma generation (8-10 hours) where the power amplifier is required to run unattended with internal safeguards to prevent damage to either the UHV chamber or the amplifier itself.

- RF generator for UHV plasma

For a new advanced labcourse experiment (μSR: muon spin resonance), an interface was designed which allows measuring the magnetic flux density and temperature inside the main coil with standard digital multimeters.

- Monitoring interface for μSR magnets

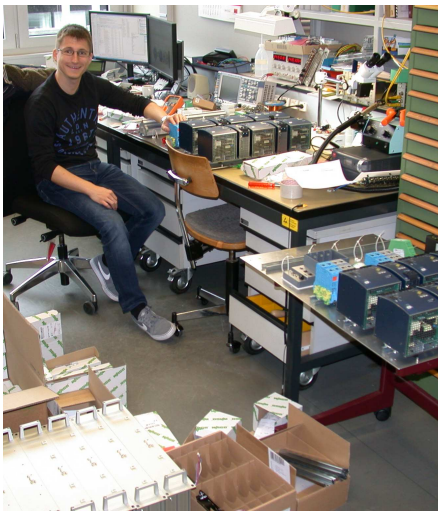
Several high-intensity light sources based on modern LED modules have been built for the group of Prof. Aegerter. These include pulsed light sources for the green and blue part of the color spectrum and an infrared device for sample illumination.



- High power LEDs including electronic pulse generator

- High power IR LED

For the CTA FlashCam project, testing and optimizing of the safety system has been ongoing, both for the prototype camera and for a second setup which is located at the institute. In parallel to the documentation work parts for safety/power cabinets for two more FlashCam cameras have been purchased and their assembly has started. Measuring the precise phase noise of an oscillator allows to evaluate their contribution to the overall noise of any data acquisition system which is of particular importance for FlashCam. For evaluation of the quality of the clock and timing distribution network a phase noise measurement system was developed and commissioned.



- David Wolf assembling power cabinets including safety devices for CTA

- Phase noise measurement unit

In preparation for the International Physics Olympiad 2016, various prototypes have been assembled and tested. The workshop is also participating in the series production of the experimental setups for the candidates.

The electronics workshop was granted an electronics apprenticeship position starting in August 2016. In parallel to the selection of a candidate for this position, the workshop is in the process of preparing the lab space and the educational program for the apprentice.