# HK 26: Instrumentation IX

Time: Wednesday 14:00–15:30 Location: SCH/A117

**Group Report** HK 26.1 Wed 14:00 SCH/A117

**Status of the readout system for the Micro-Vertex-Detector of the PANDA experiment** — Kai-Thomas Brinkmann, •Marvin Peter, and Hans-Georg Zaunick — Justus-Liebig-Universtität Giessen, Germany

The Micro-Vertex-Detector (MVD) is situated in the center of the PANDA experiment and will take on an important role in particle tracking and identification. A readout system for the silicon strip detectors is currently in development and being tested in combination with the detectors. This talk will give an overview of the readout system of the MVD strip detector prototypes. *gefördert durch BMBF

HK 26.2 Wed 14:30 SCH/A117

**The front-end signal path of the P2 experiment at MESA** — Sebastian Baunack[1], Boris Gläser[1], •Rahima Krini[1], Frank Maas[1,2,3], David R. Pineiro[2], Tobias Rimke[1], and Malte Wilfert[1] for the P2-Collaboration — [1]Institute for Nuclear Physics, Mainz, Germany — [2]Helmholtz Institute Mainz, Germany — [3]PRISMA+ Cluster of Excellence, Johannes Gutenberg-Universität Mainz

The weak mixing angle $\sin^2\theta_W$ can be measured in parity violating elastic electron-proton scattering. The aim of the P2 experiment is a very precise measurement of the weak mixing angle with an accuracy of 0.15% at a low four-momentum transfer of $Q^2$=4.5·10$^{-3}$GeV$^2$. In combination with existing measurements at the Z pole with comparable accuracy, this comprises a test of the standard model with a sensitivity towards new physics up to a mass scale of 50 TeV. The experiment will be built at the future MESA accelerator in Mainz.

The small asymmetries $\mathcal{O}(10^{-8})$ and the high precision require very high statistics and therefore an integrating measurement with the associated integrating data acquisition readout chain. A joint read-out electronics for P2 experiment in Mainz and for Moeller experiment at the Jefferson Laboratory is under development in collaboration with the University of Manitoba. The first prototype of a full differential integrating detector signal chain was built and tested at MAMI (Mainzer Mikrotron). The results fulfill the requirements of the P2 parity violation experiment and will be presented in this talk.

HK 26.3 Wed 14:45 SCH/A117

**The Data Acquisition for PANDA FAIR Phase-0 at MAMI** — Nicolo Baldicchi[1], Luigi Capozza[1], Samet Katilmis[1], Dong Liu[1], Frank Maas[1,2,3], Julian Moik[1], •Oliver Noll[1,2], David Rodriguez Piñeiro[1], Paul Schöner[1], Christoph Rosner[1], and Sahra Wolff[1] — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA+ Cluster of Excellence, Mainz, Germany

The PANDA FAIR Phase-0 experiment at the Mainz Microtron Facility (MAMI) is set to determine the double-virtual transition formfactor (TFF) of the pion. As a result, the uncertainty in the hadronic light-by-light (HLbL) calculation can be reduced. Consequently, the experiment will give new input to the hadronic corrections of the anomalous magnetic moment of the muon ($g_\mu$-2 puzzle). The detector system for the experiment is a modified version of the PANDA backward calorimeter, which was developed by the electromagnetic process group (EMP) at HI-Mainz. In contrast to the PANDA experiment, the detector will operate in forward direction within a strong electromagnetic environment. Thus, new challenges arise in terms of radiation load of the components and the handling of high event rates for the electronics. The talk addresses the developments for the data acquisition system to cope with the demanding experiment environment.

HK 26.4 Wed 15:00 SCH/A117

**Digital Signal Processing with FPGAs using Modern C++ and HLS** — •Thomas Janson and Udo Kebschull for the ALICE Germany-Collaboration — IRI, Goethe-Universität Frankfurt am Main, Max-von-Laue-Straße 12, 60438 Frankfurt am Main, Germany

In this talk, we discuss the use of Modern C++ and HLS to implement digital signal processing (DSP) algorithms on FPGAs for embedded systems. We introduce common design patterns for some simple algorithms that are suitable for continuous streaming data. The focus of this discussion is how modern C++ helps to control FPGA resource usage by applying compile-time C++ language features compared to traditional VHDL implementations. Furthermore, tests with common SOC systems and their implementation are presented.

HK 26.5 Wed 15:15 SCH/A117

**Status of the Front-End-Electronics for the CBM-TRD detector at FAIR** — •Dennis Spicker for the CBM-Collaboration — Institut für Kernphysik, Max von Laue Straße 1, 60438 Frankfurt am Main

At the future Facility for Antiproton and Ion Research (FAIR) the Compressed Baryonic Matter experiment (CBM) is supposed to measure particles from heavy-ion collisions at very high interaction rates. For this purpose, the data acquisition will run in a free-streaming mode without a hierarchical trigger system.

For the Transition Radiation Detector (TRD) the readout system is based on the Self-triggered Pulse Amplification and Digitization ASIC (SPADIC). It features a charge-sensitive amplifier, a continuously sampling ADC, a programmable digital filter and a hit detection logic. The latest version introduces new switchable features such as a low-gain mode, an additional shaping order and digital baseline tracking.

This contribution presents the latest progress towards a final version of the SPADIC chip, as well as a slow-control software framework, including a GUI, that enables the operator to easily configure the SPADIC via the underlying communication protocol "IPbus". The software offers an automated testing routine that helps to assure the quality of the front-end-electronics before installing them on the detectors.

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