HK 45: Instrumentation X

Zeit: Donnerstag 14:00–15:45 Raum: F 072

HK 45.1 Do 14:00 F 072

Unified Communication Framework (UCF) — •Dominic Gaisbauer, Igor Konorov, Dymtro Levit, and Stephan Paul — TUM Institute for Hadronic Structure and Fundamental Symmetries, Garching, Germany

UCF is a unified network protocol and FPGA firmware for high speed serial interfaces employed in Data Acquisition systems. It provides up to 64 different communication channels via a single serial link. One channel is reserved for timing and trigger information whereas the other channels can be used for slow control interfaces and data transmission. All channels are bidirectional and share network bandwidth according to assigned priority. The timing channel distributes messages with fixed and deterministic latency in one direction. From this point of view the protocol implementation is asymmetrical. The precision of the timing channel is defined by the jitter of the recovered clock and is typically in the order of 10-20 ps RMS. The timing channel has highest priority and a slow control interface should use the second highest priority channel in order to avoid long delays due to high traffic on other channels. The framework supports point-to-point connections and star-like 1:n topologies but only for optical networks with passive splitter. It always employs one of the connection parties as a master and the others as slaves. The star-like topology can be used for front-ends with low data rates or pure time distribution systems. In this case the master broadcasts information according to assigned priority whereas the slaves communicate in a time sharing manner to the master.

HK 45.2 Do 14:15 F 072

An FPGA based Pre-Processor for the ALICE TPC Readout Upgrade — •Sebastian Klewin for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg

After the major upgrade of ALICE for Run 3 of the Large Hadron Collider at CERN, the new frontend electronics of the Time Projection Chamber (TPC) will generate around 4 TB/s of raw data. This enormous amount of information can not be written and stored on disc and thus has to be processed and reduced online.

As the first processing step, a cluster finding will be performed on the data directly in the readout electronics. Looking for charge clusters already at this early stage of the readout provides the opportunity to use non zero-suppressed data which increases the sensitivity and resolution especially for small clusters. For this purpose, a 2D cluster finder is developed for and implemented in an FPGA. The high number of channels which have to be processed within a single FPGA makes this development challenging. The conceptual layout of such a cluster finder algorithm will be presented as well as first simulation results.

HK 45.3 Do 14:30 F 072

Feature extraction of the electromagnetic calorimeter preamplifier (APFEL ASIC) for the $\bar{\text{P}}$ANDA experiment at FAIR — S. Ahmed[1,2], A. Aycock[1,2], L. Capozza[1], A. Dbeyssi[1], B. Fröhlich[1,2], P. Grasemann[1,2], S. Haasler[1,2], D. Izard[1], D. Khaneft[1,2], J. Köhler[1,2], F. Maas[1,2,3], M. Carmen Mora Espí[1], •O. Noll[1,2], D. Rodríguez Piñeíro[1], J. Jorge Rico[1], S. Wolff[1,2], M. Zambrana[1,2], and I. Zimmermann[1,2] — [1]Helmholtz-Institut Mainz — [2]Institute of Nuclear Physics, Mainz — [3]PRISMA Cluster of Excellence, Mainz

The $\bar{\text{P}}$ANDA experiment at the upcoming FAIR accelerator facility will study antiproton annihilation reactions at antiproton beam momenta from 1.5 GeV/c up to 15 GeV/c. With its modular multi purpose detector system it will be able to observe a variety of physical channels. The electromagnetic process group (EMP) in Mainz is developing the backward end-cap of the electromagnetic calorimeter. Within this activity a method for the real time extraction of specific signal features using the APFEL ASIC preamplifier will be developed for the whole $\bar{\text{P}}$ANDA calorimeter. The feature extraction has to cope a multitude of requirements. It has to be high sensitive to the pulse shape. Furthermore the single channel threshold has to be lower than 3 MeV to be capable of doing the $\bar{\text{P}}$ANDA physics. Due to the high event rate of $\bar{\text{P}}$ANDA a short dead time is needed. The extraction procedure has to be efficient to achieve a short calculation time. In my talk I will point out the latest developments of the feature extraction by presenting promising candidates for the on-line extraction routine.

HK 45.4 Do 14:45 F 072

Status update of the Feature Extraction Framework for CBM-TRD — •Cruz de Jesus Garcia Chavez and Udo Kebschull for the CBM-Collaboration — Infrastructure and Computer Systems in Data Processing (IRI), Goethe University, Frankfurt am Main, Germany

The feature extraction framework is a software suite developed for FPGA firmware generation. It uses a Domain-Specific Language (DSL) description, specifically designed for the framework, which provides a fast prototyping platform for multiple levels of feature extraction algorithms. The feature extraction framework has been primary used at the CBM-TRD experiment at FAIR for which an intermediate online pre-processing stage in the readout architecture is necessary to deliver an event-filtered and bandwidth reduced data stream to the First Level Event Selection (FLES). The status update focuses on the integration of High-Level Synthesis (HLS) tools inside the framework, design space exploration and finally the application and results for the Data Acquisition Chain of the TRD experiment.

HK 45.5 Do 15:00 F 072

The quality assurance scheme of GEM foils for the ALICE TPC upgrade — •Markus Ball, Viktor Ratza, Bernhard Ketzer, and Steffen Urban for the ALICE-Collaboration — Helmholtz Institut für Strahlen- und Kernphysik, Universität Bonn

With the planned upgrade of the ALICE (A Large Ion Collider Experiment at CERN) Time Projection Chamber the current readout technology will be replaced by a Gas Electron Multiplier (GEM) - based readout technology. This allows a continuous operation at high interaction rates up to 50kHz in Pb-Pb collisions. A stack of four GEM stages with specific field field configuration was chosen to achieve a suppression of the ion backflow below 1%, while maintaining a sufficient energy resolution below $\sigma/E = 12\%$ for ^{55}Fe. The discharge probability was shown to be comparable to standard triple GEM detectors in low discharge settings.
To upgrade all the Inner and Outer Readout Chambers of ALICE, 576 GEM foils will be needed. However, taking into account a limited production yield, as well as, certain amounts of spare GEM foils, between 720 and 864 GEM foils will be produced and tested. Only GEM foils that fulfill the highest quality criteria can be used. Therefore, a stringent quality assurance (QA) scheme has been developed. The scheme includes leakage current measurements, high definition scanning of foil defects and gain uniformity measurements. A thourough documentation in a database allows to follow the QA history of each individual foil. This work is supported by BMBF.

HK 45.6 Do 15:15 F 072

Untersuchung von Silizium-Streifen-Detektoren mit einem ortsaufgelösten Infrarot-Laser-Teststand* — •Martin Kesselkaul, Kai-Thomas Brinkmann, Tommaso Quagli, Robert Schnell und Hans-Georg Zaunick für die PANDA-Kollaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen, Heinrich-Buff-Ring 16, D-35392 Gießen

Am zukünftigen Beschleunigerzentrum FAIR sollen mit dem PANDA-Experiment Vernichtungsreaktionen des Antiprotonenstrahls mit Protonen des stationären Targets (Wasserstoff und schwere Kerne) untersucht werden. Als Teil des Trackingdetektors soll der Mikrovertex-Detektor hoch aufgelöste Spurrekonstruktion und das Erkennen sekundärer Vertizes ermöglichen.

Zur Charakterisierung und Qualitätskontrolle der doppelseitigen Silizium-Streifen-Detektoren für den PANDA MVD wurde ein Laserteststand entwickelt, der die automatisierte Messung diverser für das Tracking relevanter Parameter ortsaufgelöst erlaubt. Mittels eines hochpräzisen xy-Tisches wird die Sub-Mikrometer genaue Positionierung des Lasers realisiert. Dieser Beitrag behandelt die Analyse der aufgenommenen Daten und geht auf die Ladungssammlungs-Charakteristik der einzelnen Streifen ein.

*Gefördert durch BMBF und HIC for FAIR.

HK 45.7 Do 15:30 F 072

The quality assurance database for the CBM Silicon Tracking System — •Anton Lymanets for the CBM-Collaboration — GSI, Darmstadt, Germany

For the construction of the silicon tracking detector in the CBM experiment, more than 1000 microstrip sensors including spares will be produced and integrated into detector modules at several assembly laboratories. Quality assurance of the sensors will be done both by the vendors and at the receiving institutes. In order to keep track of the final inspection data and the component flow, a database tool has been developed with the specific functionality needed in the CBM silicon tracker project. The software has been implemented using the FairDB interface that provides connectivity to the most common database engines. The C++ based library is compatible with the ROOT framework. Both graphical/web and script based interfaces are available to input, update and query the data from different locations.

In the presentation, I will summarize the database architecture, the data structure, and will give examples of particular use cases of the tool under test for the production readiness.