HK 16: Instrumentation IV

Zeit: Dienstag 11:00–12:30 Raum: F 072

Gruppenbericht HK 16.1 Di 11:00 F 072

Barrel Time-of-Flight detector for the PANDA experiment — •Ken Suzuki[1], Marius Chirita[1], Lukas Gruber[1], Dominik Steinschaden[1], Sebastian Zimmermann[1], Merlin Böhm[2], Albert Lehmann[2], Carsten Schwarz[3], Herbert Orth[4], Kai Brinkmann[5], Kamal Dutta[6], and Kushal Kalita[6] for the PANDA-Collaboration — [1]SMI — [2]Erlangen — [3]GSI — [4]HIM — [5]Gießen — [6]Assam

We describe the technical layout and the expected performance of the Barrel Time-of-Flight detector (Barrel TOF) for the PANDA target spectrometer. The Barrel TOF detector has been designed to precisely measure the time at which a charged particle transits the detector with a resolution superior to the other sub-detectors. It will signal the topology of physics events, hence setting cornerstones for event classification. The implementation of the Barrel TOF is based on very fast organic scintillator tiles coupled to Silicon Photomultipliers, in total 2000 scintillators and 16k SiPMs will be used, covering 5 m^2. The detector R&D is now in an advanced stage and the technical design report is being reviewed by the collaboration.

Gruppenbericht HK 16.2 Di 11:30 F 072

The CBM Time-of-Flight wall — •Ingo Martin Deppner and Norbert Herrmann for the CBM-Collaboration — Physikalisches Institut, Universität Heidelberg, Heidelberg

The Compressed Baryonic Matter spectrometer (CBM) is a future heavy ion experiment located at the Facility for Anti-proton and Ion Research (FAIR) in Darmstadt, Germany. The main interest of CBM is the investigation of the phase diagram of strongly interacting matter in the region of the highest baryon densities. In order to measure the necessary observables with unprecedented precision an excellent particle identification is required. The key element providing hadron identification at incident energies between 2 and 35 AGeV will be a 120 m^2 large Time-of-Flight (ToF) wall composed of Multi-gap Resistive Plate Chambers (MRPC) with a system time resolution better than 80 ps. The most demanding challenge, however, is the enormous incident particle fluxes between 100 Hz/cm^2 and 25 kHz/cm^2 generated at the highest interaction rates (10 MHz) that CBM is designed for.
The current conceptual design of the ToF-wall which is based on a modular structure composed of modules containing 4 different counter types called MRPC1 - MRPC4 will be presented. In order to elaborate the final MRPC design of these counters heavy ion test beam times were performed at SPS/CERN. In this contribution we will present recent performance test results regarding time resolution, efficiency, cluster size and rate capability for several counter types.
Work was supported partially by BMBF 05P2015 and by EU/FP7-HadronPhysics3/WP19.

HK 16.3 Di 12:00 F 072

ALICE HLT readout and FPGA based data processing in Run 2 — •Heiko Engel and Udo Kebschull for the ALICE-Collaboration — IRI, Goethe-Universität Frankfurt

The ALICE High Level Trigger (HLT) is a computing cluster dedicated to the online reconstruction, analysis and compression of experimental data. The High-Level Trigger receives detector data via serial optical links into custom PCI-Express based FPGA readout cards installed in the cluster machines. The readout cards provide the data to the host machines via Direct Memory Access (DMA). Raw data from the Time Projection Chamber (TPC) is processed already in the FPGA with a hardware cluster finding algorithm. This implementation is significantly faster than a software implementation and saves a great amount of CPU resources in the HLT cluster. It also provides some data reduction while introducing only a marginal additional latency into the readout path. This algorithm was ported to the new HLT readout hardware for Run 2, was improved for higher link rates and adjusted to the upgraded TPC Readout Control Unit (RCU2). A flexible firmware implementation allows both the old and the new TPC data format and link rates to be handled transparently. Extended protocol and data error detection, error handling and the enhanced RCU2 data ordering scheme provide an improved physics performance of the cluster finder. This contribution describes the state of the firmware developments in the HLT, the integration of the readout into the HLT framework as well as the FPGA based TPC cluster finding and its adoption to the changed readout conditions during Run 2.

HK 16.4 Di 12:15 F 072

Tracklet-based PID for the ALICE TRD Upgrade for LHC RUN 3 — •Hannah Klingenmeyer for the ALICE-Collaboration — Physikalisches Institut, University of Heidelberg

The purpose of the Transition Radiation Detector (TRD) at the Large Hadron Collider (LHC) is to provide electron identification as well as particle tracking in the central barrel of A Large Ion Collider Experiment (ALICE). For the upgrade programme of the TRD for LHC RUN 3, the read-out of online-processed track segments instead of raw clusters in order to reduce the data volume and increase the read-out speed is foreseen. These so-called tracklets contain information about position, incident angle and particle identification (PID), written to a 32-bit word. The challenge of a tracklet-only read-out in terms of PID will be to ensure the highest performance possible with the bit size available in the tracklet word. In this talk, the current state of a tracklet-based PID approach to be used in LHC RUN 3 is discussed. A multi-dimensional likelihood method is applied to the tracklet data, enabling the extraction of the pion rejection for a given electron efficiency as a means of judging the quality of the PID performance.