HK 9: Accelerators and Instrumentation I

Time: Monday 14:00–16:00 Location: H-ZO 80

Group Report HK 9.1 Mo 14:00 H-ZO 80

Event reconstruction and analysis in the CBM experiment — •Volker Friese for the CBM-Collaboration — GSI Darmstadt

The Compressed Baronic Matter (CBM) experiment, being developed for operation at the future FAIR facility in Darmstadt, will investigate nuclear collisions at unprecedented interaction rates of up to 10 MHz, which will give access to extremly rare probes like charm production near threshold. Fast, efficient and precise algorithms for both online and offline reconstruction are required to achieve the physics goals of CBM. We will discuss the current approaches to various aspects of event reconstruction in CBM, such as track reconstruction in the main tracking system (STS), reconstruction of displaced vertices of open charm, pattern recognition in the RICH detector, and shower reconstruction in the EM calorimeter. Selected results of feasibility studies for physics observables based on these algorithms will be presented as well.

HK 9.2 Mo 14:30 H-ZO 80

Reconstruction performance of the ALICE Transition Radiation Detector — •Markus Fasel[1,2], Anton Andronic[1], and Bercuci Alexandru[1] for the ALICE-TRD-Collaboration — [1]GSI, Planckstr. 1, 64291 Darmstadt — [2]Technische Universität Darmstadt, Hochschulstraße 12, 64289 Darmstadt

The Transition Radiation Detector(TRD) is an important component of the ALICE experiment at LHC. With tracking and particle identification capabilities, the TRD will contribute significantly to the measurement of quarkonia, open heavy flavours, and jets. During the commissioning of the LHC in the fall of 2008 cosmic-ray data were taken with the ALICE setup including four supermodules of the Transition Radiation Detector. We present the results on the reconstruction performance of the TRD obtained with cosmic-rays. We focus on the position resolution and the accuracy of matching with the Time Projection Chamber.

HK 9.3 Mo 14:45 H-ZO 80

Study of the effect of data compression on the position resolution of the ALICE TRD — •Svenja Wulff for the ALICE-TRD-Collaboration — Institut für Kernphysik, WWU Münster, Germany

The Transition Radiation Detector (TRD) of ALICE at the Large Hadron Collider consists of 540 Xe gas-filled drift chambers with a total active area of roughly 700 m^2 read out via 1.2 million electronic channels. To keep the readout time as short as possible and to optimize the usage of mass storage the data is compressed on the fly. One method is the so-called 'zero suppression'. The Tracklet Processing Chip is the component of the TRD front-end electronics and performs digital filtering of the raw data including baseline subtraction, tail cancellation and corrections of gain variations. For the purpose of zero suppression it is equipped with a mechanism to mark channels for read out based on three criteria to avoid that channels are read out containing fluctuations around the baseline only.

A systematic study of the effect of zero suppression with various sets of criteria on the event size and on the position resolution of the read out chambers will be presented. Cosmic rays have been used for this study.

HK 9.4 Mo 15:00 H-ZO 80

The ALICE High-Level Trigger — •Jochen Thäder for the ALICE-HLT-Collaboration — Kirchhoff-Institut für Physik, Universität Heidelberg

The High-Level Trigger (HLT) for the heavy ion experiment ALICE is a PC cluster of several 100 nodes, which has to reduce the data rate of up to 25 GB/s to at most 1.25 GB/s before permanent storage. For the ongoing commissioning of the ALICE detector and the first year LHC injection tests, the HLT has installed the first 100 nodes, consisting of a group of front-end processor nodes which receive the data from the front-end electronics and a group of computing nodes, as well as the HLT management infrastructure.

During the ALICE commissioning in 2008, the HLT itself was commissioned as a part of of the whole ALICE data-taking system. It was performing online first and second level reconstruction, online data compression and calibration as well as providing online event visualization for the DiMuon, PHOS, SDD, TPC and TRD detectors. Online raw data compression and reconstruction for SDD and PHOS detectors were performed during the first LHC runs.

The experiences made during the commissioning of the HLT itself, the ALICE cosmic runs as well as the first LHC runs will be presented in this talk.

Work on the ALICE High-Level Trigger has been financed by the German Federal Ministry of Education and Research (BMBF) as part of its program "Förderschwerpunkt Hadronen- und Kernphysik - Großgeräte der physikalischen Grundlagenforschung".

HK 9.5 Mo 15:15 H-ZO 80

Exploiting Virtualisation at Alice HLT — •Stefan Boettger, Volker Lindenstruth, and Udo Kebschull for the ALICE-HLT-Collaboration — Kirchhoff-Institut für Physik, Heidelberg

The Alice HLT cluster is a computing farm intended to do on-line event processing for the ALICE Experiment at CERN. It is known that at run-time of the experiment there are phases where few or no data is available for processing. The same applies for maintenance cycles of both the experiment and the cluster. With respect to the costs of maintaining and running such a cluster there is the need to maximize the usage of this computing facility. Therefor the usage of those idle times with third-party off-line physics computations was proposed. To satisfy the constraints of on-line and off-line applications and to avoid interferences, the usage of os virtualisation has been evaluated. Moreover, a comparison between Vmware-Server and Xen concerning system-level performance and usability was done. Results show Xen to be superior to Vmware-Server regarding general performance measurements, yet being more complicated to install and maintain. It could be shown that os virtualisation is a feasible way of using idle cycles, avoiding application interferences and maximizing cluster usage by suspending and migrating of virtual systems. A future extension based on automated switching between on-line and off-line data processing using the SysMES cluster management framework is proposed.

HK 9.6 Mo 15:30 H-ZO 80

Upgrade of the HADES data acquisition system — •Marek Palka for the HADES-Collaboration — Jagiellonian University, Cracow, Poland — Gesellschaft für Schwerionenforschung, Darmstadt, Germany

Next years HADES will be moved to the upcoming FAIR accelerator complex. Here, HADES-at-FAIR will continue its experimental program. Due to mentioned future plans, the detector undergoes an upgrade. In order to be able to take the data in the Au+Au collision system at 8 GeV/u with a sustained trigger rate of 20 kHz (in peak 100 kHz) and expected average amount of the data 300 MB/s, our trigger and readout system has to be improved. A major part of the new DAQ system is the general-purpose Trigger and Readout Board (TRB), which serves as a platform for all other subsystems. To broaden the spectrum of possible applications, in the future DAQ-systems, we added a very high data-rate digital interface connector to this board (15 Gbit/s). It gives the possibility to mount an add-on boards to the TRB. The add-on boards then provide the detector-specific interfaces (special connectors) or FEE (like ADCs) and additional computing resources (FPGAs). All required add-on modules for the HADES-at-FAIR upgrade have been built and their basic functionality has been tested. The major steps of the upgrade program will be shown in several parts : overview of the general DAQ concept, general readout platform, readout electronics for our detectors (add-ons), new event building concept, slow control, trigger distribution system and moreover also a part of the front-end electronics.

HK 9.7 Mo 15:45 H-ZO 80

TrbNet - The Trigger and Readout Network for the HADES experiment — •Jan Michel[1], Michael Böhmer[3], Ingo Fröhlich[1], Marek Palka[4], Joachim Stroth[1,2], Attilio Tarantola[2], and Michael Traxler[2] for the HADES-Collaboration — [1]Institut für Kernphysik, Goethe-Universität, Germany — [2]GSI, Darmstadt, Germany — [3]TU München, Germany — [4]Jagiellonian University, Krakow, Poland

The HADES experiment is currently undergoing a rebuilt of the data readout system. Here, boards equipped with freely configurable FPGAs and high bandwidth data links have been designed. In this con-

text, a new trigger distribution and data transportation protocol has been developed.

The main features are a fast and reliable data transport as well as a wide range of configuration options to adapt to the special needs of each subsystem. All boards will be accessible independently to allow for extensive controlling and monitoring features. Since the same network will be used for both trigger distribution and data transport, special care had to be taken to deliver trigger signals to the whole network within a few microseconds to keep the deadtime of the detector low.

In this contribution the concept and structure of the protocol is presented. Work supported by EU under the contracts CNI (515876) and the BMBF.