HK 57: Instrumentation

Zeit: Freitag 11:00–13:00 Raum: P 2

Gruppenbericht HK 57.1 Fr 11:00 P 2

Das Simulations- und Analyseframework FairRoot — •Florian Uhlig[1], Mohammad Al-Turany[1], Denis Bertini[1], Radek Karabowicz[1], Dymtro Kresan[1] und Tobias Stockmanns[2] — [1]GSI Darmstadt — [2]FZ Jülich

FairRoot ist ein auf ROOT aufbauendes objektorientiertes Software-Framework zur Simulation, Rekonstruktion und Analyse von Daten. Es stellt eine Basis- Infrastruktur zur Verfügung, die es den Usern erlaubt in sehr einfacher Weise ihre Detektorsimulationen und Datenanalysen zu erstellen.

FairRoot wird mittlerweile nicht nur von CBM, Panda, R3B and ASYEOS bei GSI/FAIR benutzt. Auch das MPD-Experiment in Dubna und die EIC Kollaboration am Brookhaven National Laboratory benutzen FairRoot für ihre Detektorsimulationen.

Da ein Teil der FAIR-Experimente keinen Trigger verwenden werden, und es so für die ersten Schritte der Datenanalyse keine zusammengefassten Ereignisse geben wird, muss die Datenanalyse einen Strom an Eingangsdaten verarbeiten können. Diese neue Art der Datenanalyse muss vorher mit Hilfe von Simulationen untersucht werden. Die gängigen Simulationspakete Geant3 und Geant4 liefern die Ergebnisse allerdings Ereignisweise. FairRoot bietet nun die Möglchkeit diese Einzelereignisse in einen Datenstrom zu überführen.

Der Vortrag wird die Möglichkeiten von FairRoot im Allgemeinen beschreiben und im besonderen ein Augenmerk auf die zeitbasierte Simulation und Datenanalyse legen.

HK 57.2 Fr 11:30 P 2

The Hierarchical CBM Network Structure and the CBMnet V2.0 Protocol — •Frank Lemke, Sven Schenk, and Ulrich Bruening for the CBM-Collaboration — ZITI University of Heidelberg, Mannheim, Germany

The CBMnet V2.0 Protocol of the DAQ System within the Compressed Baryonic Matter (CBM) experiment at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt has been demonstrated successfully to be a reliable solution for network communication. It delivers a unified communication over a bidirectional link containing control, data, and synchronization messages and includes clock distribution. In the most recently used setup, 20 Read-Out-Controller (ROC), 5 Data Combiner Boards (DCB), and 4 data sinks were deployed in a hierarchical network. Successful tests for a planned Spartan 6 Board, which will deliver ROC or DCB functionality, were performed and the CBMnet protocol was adapted for achieving all features for the final experiment setup. The CBMnet V2.0 implementation differs in regard to the data handling by delivering reliable data communication. It can be obtained and is easily adaptable to all CBM network parts. CBMnet V2.0 is already integrated into a first tapeout for a front-end detector ASIC. The final setup will have advantages compared to other system solutions. It is specially designed to cater to requirements of CBM. The most important features is that there will be no protocol conversion in the system. Also the hierarchical structure for CBM delivering all communication and synchronization traffic over one link together with link bundling and data rate scaling will minimize the amount of links.

HK 57.3 Fr 11:45 P 2

Cluster Usage Increasing by Virtualization for On-line Clusters — •Stefan Boettger, Udo Kebschull, Camilo Lara, and Jochen Ulrich for the ALICE-Collaboration — Infrastructure and Computer Systems for Data Processing (IRI), Goethe-University Frankfurt/Main

The ALICE HLT Cluster is a computing farm doing on-line event processing for the ALICE Experiment at CERN. It is known that at runtime 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. A toolset has been developed which makes free cluster resources available for third-party applications. The toolset uses virtualization to host third party applications and, most importantly, can be configured such, that the event processing is not affected by third party applications. This is achieved by both local and central resource (re)allocation mechanisms, e.g. by using suspend/resume or live-migration. In this work results like increased cluster usage are shown for the co-operation of event-processing and third party applications. Furthermore a synthezised, more general application is run together with third party applications to demonstrate the suitability of the toolset for other environments.

HK 57.4 Fr 12:00 P 2

Simulation and reconstruction of the PANDA Barrel DIRC — Klaus Götzen[1], •Maria Patsyuk[1,2], Klaus Peters[1,2], Carsten Schwarz[1], Jochen Schwiening[1], and Marko Zühlsdorf[1,2] for the PANDA-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt — [2]Göthe-Universität Frankfurt

A compact ring imaging Cherenkov detector is being developed to meet the requirements for charged particle identification for the PANDA experiment at the FAIR (Facility for Antiproton and Ion Research) project. It will cover the barrel region (large range of solid angle and momentum) of the PANDA multi-purpose detector, which will study the nature of strong interactions in detail. The concept and the current design of the PANDA Barrel DIRC were inspired by the successful BABAR DIRC with some important improvements, such as fast photon timing, a compact expansion volume, and focusing optics. Simulation of the detector within Geant4 is an essential acpect of the R&D of the PANDA Barrel DIRC, which focuses on cost optimization and performance improvement. Several design options were implemented in the simulation, and a fast reconstruction procedure based on look-up tables was used to determine the photon yield per particle and the single photon Cherenkov angle resolution. We present the detatils of comparison of these designs.

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HK 57.5 Fr 12:15 P 2

Entwicklung eines Simulationsmodells für bestrahlte Monolithic Active Pixel Sensoren * — •Melissa Domachowski für die CBM-MVD-Kollaboration — Goethe-Universität, Frankfurt

Um den Anforderungen von zukünftigen Experimenten, wie dem CBM-Experiment, gerecht zu werden, wurde die Strahlentoleranz von Monolithic Active Pixel Sensors (MAPS) in den letzten Jahren deutlich gesteigert. Dies gelang durch die Absenkung der Dotierung des sensitiven Volumens der Pixelsensoren, welche eine teilweise Verarmung dieses Volumens ermöglicht. Die hierdurch beschleunigte Ladungssammlung wirkt der durch Volumenschäden verursachten Rekombination der Signalladungsträger entgegen.

Bislang existierte kein Digitizer, der eine Beschreibung der neuen MAPS-Generation mit Simulationsprogrammen wie GEANT oder CBMRoot erlaubte. Zu diesem Zweck wurde das Ansprechverhalten der Sensoren für verschiedene Bestrahlungsstufen vermessen und ein existierender Digitizer für den Fall strahlentoleranter MAPS erweitert.

Dieser Beitrag stellt die Funktionsweise des CBM-MVD Digitizers vor und präsentiert aktuelle Ergebnisse, die dessen Gültigkeit für strahlentolerante MAPS belegen.

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HK 57.6 Fr 12:30 P 2

Experimental Tests and GEANT4 Simulations of Detectors for the EXL — •J. C. Zamora[1], T. Kröll[1], M. v. Schmid[1], T. Davinson[2], P. Egelhof[3], V. Eremin[4], S. Ilieva[1], N. Kalantar[5], M. A. Najafi[5], M. Mutterer[3], C. Rigollet[5], J. A. Scarpaci[6], B. Streicher[3,5], J. Van de Walle[5], and P. J. Woods[2] — [1]IKP, TU Darmstadt — [2]University of Edinburgh — [3]GSI, Darmstadt — [4]PTI, St. Petersburg — [5]KVI, Groningen — [6]IPN, Orsay

The aim of the EXL project is the investigation of light-ion reactions in inverse kinematics by using the storage ring NESR (at FAIR) and a universal detector system providing high resolution and large solid angle coverage in kinematically complete measurements. The design of this detector system includes different silicon (Si(Li) and DSSD) detectors for tracking and energy measurements, as well as CsI scintillators for an external calorimeter shell. Prototypes of these detectors have already been constructed and tested in experiments, e.g., one performed at KVI with 135 MeV protons. Nevertheless, some questions have arisen regarding the complete understanding of the single detector response, and also, the possible influence in neighbor ones. In order to comprehend the experimental response of these detectors, we have performed GEANT4 simulations for the different tested devices. Simulations describe the experimental results successfully, what will help us to investigate more complex processes, such as light cross-talk between scintillation crystals or charge cross-talk in DSSD. Current status of the simulations and comparison with the experimental results will be discussed. Work supported by HIC for FAIR and BMBF (06DA9040I).

HK 57.7 Fr 12:45 P 2

Optimization of Atomic Beam Sources for Polarization Experiments — •Martin Gaisser, Alexander Nass, and Hans Ströher — IKP, Forschungszentrum Jülich, Germany

For experiments with spinpolarized protons and neutrons a dense target is required. In current atomic beam sources an atomic hydrogen or deuterium beam is expanded through a cold nozzle and a system of sextupole magnets and RF-transition units selects a certain hyperfine state. The achievable flux seems to be limited to about 10^{17} particles per second with a high nuclear polarization. A lot of experimental and theoretical effort has been undertaken to understand all effects and to increase the flux. However, improvements have remained marginal. Now, a Monte Carlo simulation based on the DSMC part of the open source C++ library OpenFOAM is set up in order to get a better understanding of the flow and to optimize the various elements. The goal is to include important effects like deflection from a magnetic field, recombination on the walls and spin exchange collisions in the simulation and make quantitative predictions of changes in the experimental setup. The goal is to get a tool that helps to further increase the output of an atomic beam source.