HK 63: Instrumentation XVI

Time: Thursday 15:45–17:00 Location: SCH/A251

Group Report HK 63.1 Thu 15:45 SCH/A251

Der PANDA-Luminositätsdetektor — •Heinrich Leithoff[1], Achim Denig[1], Christof Motzko[2], Jannik Petersen[2], Florian Feldbauer[3], Gerhard Reicherz[3], Roman Klasen[3], Stephan Maldaner[3], Niels Boelger[3], Stephan Bökelmann[3], René Hagdorn[3] und Miriam Fritsch[3] — [1]Johannes-Gutenberg Universität Mainz — [2]Helmholtz Institut Mainz — [3]Ruhr-Universität Bochum

Das zukünftige PANDA-Experiment, welches im Antiprotonenring HESR als Teil der im Bau befindlichen FAIR Beschleunigeranlage bei Darmstadt entsteht, ist optimiert, um Fragen der Hadronenphysik zu untersuchen. Es bietet herausragende Voraussetzungen zur Suche nach neuen Zuständen sowie der präzisen Vermessung bekannter Zustände. In der dafür verwendeten Energie-Scan-Methode ist die exakte Kenntnis der Luminosität zur Normierung essentiell. Diese wird bei PANDA aus der Winkelverteilung der elastisch gestreuten Antiprotonen extrahiert. Für die geforderte absolute Messgenauigkeit von besser als 5% werden die Spuren der elastisch gestreuten Antiprotonen mit 4 Ebenen gedünnter Siliziumpixelsensoren (HV-MAPS) gemessen. Diese Sensoren mit integrierter Ausleseelektronik werden auf CVD-Diamantscheiben aufgeklebt in zwei verfahrbaren Halbdetektoren montiert und zur Reduktion der Vielfachstreuung im Vakuum betrieben. Präsentiert werden das Konzept des Luminositätsdetektors mit technischen Aspekten wie Vakuumsystem, Kühlung und Elektronik sowie Einblicken in die Datenanalyse.

HK 63.2 Thu 16:15 SCH/A251

Performance on the STS detector in Ni+Ni collisions at 1.93 AGeV with the mCBM setup at SIS18 — •Dario Alberto Ramirez Zaldivar for the CBM-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The Compressed Baryonic Matter (CBM) is one of the experimental pillars at the FAIR facility. CBM focuses on the search for a signal of the phase transition between hadronic and quark-gluon matter, the QCD critical endpoint, new forms of strange-matter, in-medium modifications of hadrons, and the onset of chiral symmetry restoration. The Silicon Tracking System is the central detector for momentum measurement and charged-particle identification. It is designed to measure Au+Au collisions at interaction rates up to 10 MHz. It comprises approximately 900 double-sided silicon strip sensors arranged in 8 tracking stations, resulting in 1.8 million channels, having the most demanding requirements in terms of bandwidth and density of all CBM detectors. The mini-CBM (mCBM) project is a small-scale precursor of the full CBM detector, consisting of sub-units of all major CBM systems which aims to verify CBM's concepts of free-streaming readout electronics, data transport, and online reconstruction. In the 2022 beam campaign at SIS18 (GSI) Ni+Ni collisions at 1.93 AGeV were measured with an average collision rate of 400 kHz. The mini-STS (mSTS) setup for the campaign consists of 2 stations with 11 sensors. The results from data taken in the 2022 beam campaign will be presented focusing on the hit reconstruction and mSTS performance studies.

HK 63.3 Thu 16:30 SCH/A251

Characterization and test of STS modules for the E16 experiment — •Dairon Rodriguez Garces for the CBM-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The J-PARC E16 experiment has the goal to search for signatures of the spontaneously broken chiral symmetry and its (partial) restoration, through di-electron detection from slowly moving vector mesons, particularly the phi meson, produced in proton-nucleus collisions. For this purpose, the experiment will use modules constructed using the same technology and procedures as the modules of the Silicon Tracking System (STS) of the CBM experiment.

A total of 10 modules were assembled at the Detector Lab in GSI. This is the first time a series of modules is produced with final components, and systematically tested. Each module has a double-sided silicon sensor, connected via a stack of microcables to a pair front-end boards (FEBs) with 8 ASICs (STS-XYTERv2) each. The characterization of the E16 modules was carried out through the STS testing procedure that includes the determination of the set of the operational parameters for each module (ADC calibration, etc.), testing the performance (ENC noise, the linearity of the ADC and the homogeneity of the channels response), and also the identification of the broken channels.

This work will show the results of testing and characterizing the E16 modules and the insights that we have gained from it for the upcoming series production of STS modules.

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Dosimetry with test structures of the PANDA Micro-Vertex-Detector — •Nils Tröll — II. Physikalisches Institut, Giessen

Electrical characterization and radiation damage is carried out on double-sided silicon strip detectors and pin diodes representing a test structure with electrical properties for the Micro-Vertex-Detector (MVD), which will be the innermost tracking detector of the PANDA experiment.

Therefore, the silicon diodes of the MVD are used in a dosimeter con- cept for measurements of ionizing radiation dose. The energy calibra- tion is carried out at the Marburg Ion Beam Therapy Centre (MIT) and by various laboratory radiation sources. Signal generation by the sensors is observed to determine performance parameters for the MVD. Additionally, static electrical properties, like the depletion voltage, al- low a characterization of radiation tolerance of the silicon diodes. The work is supported by the BMBF.