HK 49: Instrumentation XI

Time: Thursday 14:00–16:00 Location: J-HS D

Group Report HK 49.1 Thu 14:00 J-HS D

Towards the CBM-MVD* — •Michael Deveaux for the CBM-MVD-Collaboration — Goethe Universität Frankfurt

The Compressed Baryonic Matter Experiment (CBM) is one of the core experiments of the future FAIR facility. It will explore the phase diagram of strongly interacting matter in the regime of high net baryon densities with numerous probes, among them open charm. The Micro Vertex Detector (MVD) will contribute to the secondary vertex determination on a 10 μm scale, background rejection in di-electron spectroscopy and reconstruction of weak decays of multi-strange baryons. The detector comprises four stations placed next to the target in vacuum, allowing for two distinct station arrangements. The stations will be populated with 50 μm thin, highly-granular customized Monolithic Active Pixel Sensors (called "MIMOSIS"), which are being developed aiming at a spatial precision in the order of ~ 5 μm, a readout speed of less than 5 μs/frame, a radiation tolerance of $\sim 7 \times 10^{13}$ n_{eq}/cm^2 and 5 Mrad. This contribution will summarize the status of activities towards constructing the MVD, that involve in particular CMOS sensor development together with the IPHC Strasbourg.

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Group Report HK 49.2 Thu 14:30 J-HS D

Der PANDA Luminositätsdetektor — •Florian Feldbauer für die PANDA-Kollaboration — Ruhr-Universität Bochum

Das PANDA-Experiment, welches im Antiproton-Speicherring HESR an der im Bau befindlichen Beschleunigeranlage FAIR in Darmstadt stehen wird, ist für Fragen der Hadronenphysik optimiert. Mit dieser Anlage wird es möglich sein, neue Zustände zu entdecken und die Linienform dieser wie auch bereits bekannter Zustände sehr präzise zu vermessen. Zur Normierung der dafür verwendeten Energie-Scan-Messungen wird die exakte Kenntnis der Luminosität benötigt.
Die Luminosität wird bei PANDA anhand der Winkelverteilung der elastischen Antiproton-Proton-Streuung bestimmt. Um eine absolute Messgenauigkeit von 5% zu erreichen werden die Spuren der gestreuten Antiprotonen gemessen. Dazu werden 4 Detektorebenen mit gedünnten Siliziumsensoren verwendet (HV-MAPS). HV-MAPS sind Pixelsensoren mit integrierter Ausleseelektronik. Sie werden mit einer Sperrspannung von 60 V betrieben, um die Strahlenhärte zu erhöhen. Die 4 Ebenen, die verfahrbar montiert sind, bestehen aus CVD-Diamanten auf denen die Sensoren aufgeklebt sind. Zur Reduktion der Vielfachstreuung wird der Aufbau im Vakuum betrieben.
Das Konzept des Luminositätsdetektors wird vorgestellt und dabei technische Aspekte wie Sensoren, Vakuumsystem, Kühlung und Elektronik diskutiert, sowie Einblicke in die Datenanlyse gegeben.

Group Report HK 49.3 Thu 15:00 J-HS D

The Silicon Tracking System of CBM: from design considerations towards first tests with heavy ion collisions — •Adrian Rodriguez Rodriguez for the CBM-Collaboration — Goethe University Frankfurt am Main

The Silicon Tracking System (STS) is the central detector for charged-particle identification and momentum determination in the future CBM experiment at the new FAIR accelerator facility. It is designed to measure up to 800 charged particles in nucleus-nucleus collisions at interaction rates up to 10 MHz, to achieve a momentum resolution better than 2% inside 1 Tm magnetic field, and to be capable of identifying complex particle decays topologies, e.g., such with strangeness content. The STS comprises eight tracking stations equipped with double-sided silicon microstrip sensors. Two million channels are read out with self-triggering electronics, matching the data streaming and online event analysis concept of the experiment. The STS functional building block is a module consisting of a sensor, micro-cables and two front-end electronics boards, carrying the custom-developed readout ASIC "STS-XYTER". This presentation aims to show an overview of the development status of the module components, readout chain and system integration towards the beginning of the series production, and in the context of FAIR Phase 0 activities.

HK 49.4 Thu 15:30 J-HS D

Aspects of ladder assembly for the Silicon Tracking System of the CBM Experiment at FAIR — •Shaifali Mehta for the CBM-Collaboration — University of Tuebingen

The Silicon Tracking System (STS) is the central detector for the charged-particle measure- ment and momentum determination in the future CBM experiment. It comprises of about 900 low-mass detector modules, based on double-sided silicon micro-strip sensors distributed on 8 tracking stations. These stations are made from mechanical half units onto which car- bon fiber detector ladders are mounted holding the modules. The positioning of modules assembled on the ladder is expected to be in the order of 100 μm. In STS self-triggering readout electronics are used which is capable of acquiring data at collision rate up to 10 Mhz. To read-out, the double-sided microstrip sensors, STS XYTER, a dedicated ASIC is used. In this presentation, different aspects and techniques of assembling a ladder will be discussed. During the assembly of the ladder and module, various glues are used at different steps and to test the thermal property of those glues is very important. Along with the assembly techniques, results from the thermal cycling tests will be presented in this talk.

HK 49.5 Thu 15:45 J-HS D

Upgrades to the LYCCA setup for FAIR@GSI — •David Werner[1], Madalina Ravar[1], Peter Reiter[1], Stefan Thiel[1], Christoph Goergen[1], Konrad Arnswald[1], Maximilian Droste[1], Herbert Hess[1], Rouven Hirsch[1], Levent Kaya[1], Lars Lewandowski[1], Michael Seidlitz[1], Kai Wolf[1], Dirk Rudolph[2], Pavel Golubev[2], Luis Sarmiento[2], and Patrick Coleman-Smith[3] — [1]University of Cologne, Institute for Nuclear Physics, Cologne, Germany — [2]Lund University, Department of Physics, Lund, Sweden — [3]Science and Technology Facilities Council, Daresbury, England

The Lund-York-Cologne-Calorimeter (LYCCA) is a detector array consisting of 24 Double-sided Silicon Strip Detectors (DSSSDs) and a digital data acquisition system using the ASIC based AIDA front-end electronics. Its more than 1.5π angular coverage, customizable detector positioning and 32 strips per detector side allow for precise measurement of angular correlations of particles with high efficiency. The setup was used during the NUSTAR-PRESPEC campaign and will be part of the NUSTAR HISPEC/DESPEC experiments at FAIR@GSI. During the past two years substantial improvements to LYCCA have been implemented, which will be detailed in the talk. After the upgrades a series of nuclear astrophysics experiments with a $^{nat.}$C(α, α')C* reaction with beam energies between 20 and 28.5 MeV were conducted at the 10 MV FN-tandem accelerator of the Institute for Nuclear Physics of the University of Cologne. Preliminary results from the latest two beam times will be presented. Supported by GSI F&E KREITE 1416.