HK 64: Instrumentierung

Zeit: Freitag 14:00–16:00 Raum: HZ 9

HK 64.1 Fr 14:00 HZ 9

The Influence of Additional Semiconductor Discs on the Reconstruction of $\overline{\Lambda}\Lambda$ in the $\overline{\mathrm{P}}$ANDA Experiment — •Simone Esch, Tobias Stockmanns, and James Ritman for the PANDA-Collaboration — IKP, Forschungszentrum Jülich

The $\overline{\mathrm{P}}$ANDA detector is one of the main experiments at the upcoming Facility for Antiproton and Ion Research in Darmstadt (FAIR). The fixed target experiment will explore $\overline{\mathrm{p}}$p annihilation with intense, phase space cooled beams with momenta between 1.5 and 15 GeV/c. $\overline{\mathrm{P}}$ANDA is able to measure a wide range of charmed and strange hyperons to study the dynamic of quark pair creation and hadronization. Plans exist to enlarge the acceptance of the $\overline{\mathrm{P}}$ANDA Micro Vertex Detector in beam direction by adding two additional semiconductor discs to improve the detection of long living particles like hyperons. As a first test of these disks a simulation has been done of the physics process $\overline{\mathrm{p}}\mathrm{p} \rightarrow \overline{\Lambda}\Lambda \rightarrow \overline{\mathrm{p}}\pi^{+}\mathrm{p}\pi^{-}$

A comparison of the reconstruction of this channel with and without the additional disks will be presented.

HK 64.2 Fr 14:15 HZ 9

Employing the CBM Micro Vertex Detector for background rejection in dilepton analyses — •Erik Krebs for the CBM-Collaboration — Goethe-Universität Frankfurt

The light vector mesons ρ, ω and ϕ are known to be excellent probes of the processes taking place in violent heavy-ion collisions. The leptonic decay channels of these mesons are of special interest as the leptons leave the hot and dense fireball without further interaction and may reveal information on the characteristics of the matter created in the collisions. However, electrons and positrons from γ-conversions and Dalitz decays of π^0 are the main contributors to a large combinatorial background obscuring the information carried by the dileptons.

The Micro-Vertex Detector (MVD) of the Compressed Baryonic Matter (CBM) experiment may contribute to reduce this background by employing two methods. The excellent position resolution of the MVD and its proximity to the target gives a chance to reject close pairs by measuring the distance between nearest hits. A specific field configuration will be required for this approach. A second approach is to reconstruct the low momentum partner of a conversion electron in the MVD.

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HK 64.3 Fr 14:30 HZ 9

Development of a CO_2 Cooling System for the CBM Silicon Tracking System — •Jorge Sanchez Rosado for the CBM-Collaboration — GSI Helmholtzzentrum, Darmstadt

The Silicon Tracking System (STS) is the central detector system of the Compressed Baryonic Matter experiment (CBM) at FAIR. Its 2,5 million channel read-out electronics will dissipate ∼40 kW in a confined volume of 2 m^3.

A two phase (evaporative) CO_2 cooling system is taken as the first choice to extract the dissipated heat fulfilling the requirements such as reduction of mass budget and the use of smaller diameter for cooling pipes. The 2-Phase Accumulator Controlled Loop (2PACL) concept conceived at NIKHEF is the ideal method due to its stability and the only need of passive components inside the detector volume.

A 1 kW prototype plant is shown which is being assembled presently at GSI and will go into operation in summer 2014.

Supported by EU-FP7 HadronPhysics3 and CRISP.

HK 64.4 Fr 14:45 HZ 9

Development of radiation tolerant microstrip sensors for the CBM Silicon Tracking System — •Minni Singla for the CBM-Collaboration — Goethe Universität Frankfurt

The Silicon Tracking System (STS) is the central detector system of the Compressed Baryonic Matter experiment (CBM) at FAIR investigating the phase diagram of strongly interacting matter in nucleus-nucleus collisions with collision rates up to 10 MHz. The extreme interaction rates require radiation tolerant detector components. An overview of the development of radiation tolerant STS microstrip prototype sensors will be presented including test results for irradiated sensors. For this purpose the prototype sensors had been irradiated at the TRIGA nuclear reactor of the University of Ljubljana. Besides the static measurements, the charge collection efficiency of these irradiated sensors was measured. Additionally a controlled thermal annealing of the sensors has been performed to extract the beneficial and reverse annealing time constants which will help to develop an operational scenario for the STS.

Supported by EU-FP7 HadronPhysics3, HIC for FAIR, HGS-HIRe and H-QM.

HK 64.5 Fr 15:00 HZ 9

Commissioning of the recoil detector for the day-one experiment at HESR with pp elastic scattering at COSY — •Huagen Xu — Forschungszentrum Juelich

The conceptual design of the luminosity monitor for the PANDA experiment is based on measuring the differential elastic antiproton-proton scattering rate by 4 planes of HV-MAPS tracking detector. The absolute precision is limited by the lack of existing data in the relevant momentum region. Therefore, the so-called Day-One experiment at HESR will measure antiproton-proton elastic scattering. The goal of this experiment is to measure a wide range of 4-momentum transfer t (0.0008-0.1 GeV^2) so that the contribution of the physical differential distributions to the absolute luminosity uncertainty is less than 1%. The polar angle of scattered antiprotons and the energy of recoil protons will be measured at forward angles by tracking detectors and by thick energy detectors near 90°, respectively. In order to test the method proposed for the Day-One experiment one of the recoil arms has been designed and built. The commissioning of the recoil arm by measuring proton-proton elastic scattering has been performed at COSY in July and September of 2013. The preliminary results of the commissioning will be presented.

HK 64.6 Fr 15:15 HZ 9

Performance Test and Commissioning of Recoil Detectors of HESR Day-One Experiment — •qiang hu[1,2], huagen xu[2], and james ritman[2] — [1]Institute of Modern Physics, CAS, 730000 Lanzhou, China — [2]Forschungszentrum Juelich, 52425 Juelich, Germany

The proposed Day-One experiment at HESR is to measure antiproton-proton elastic scattering in a large range of four momentum transfer squared t (0.0008 - 0.1 GeV^2). One goal of the experiment is to determine the elastic differential parameters, i.e. σ_T, ρ and b. The elastic scattered antiproton and recoil proton will be measured by tracking detectors in the forward angle region and by recoil detectors near θ=90°, respectively. The recoil detectors consist of two silicon detectors and two germanium detectors which cover a polar angle from 71° to 91.5°. All detectors are single-sided structure with 1.2 mm pitch on the front side. The two silicon detectors have the same dimensions, 76.8 mm × 50.0 mm × 1.0 mm. The two germanium detectors have the same sensitive area but different thickness, 80.4 mm × 50.0 mm × 5.0 (11.0) mm.

After assembling and system tests in the laboratory with radioactive source ^{244}Cm, the detector system has been installed into COSY ring. The commissioning experiments by using proton beam has been performed in 2013. Data of proton-proton elastic scattering has been taken at several momenta. Preliminary data analysis indicate that the recoil detectors are working as good as expected. The latest results will be presented.

HK 64.7 Fr 15:30 HZ 9

Development of a Compton camera for online ion beam range verification via prompt γ detection * — •Saad Aldawood[1,2], Christian Lang[1], Hugh van der Kolff[1,3], Ludwig Maier[4], Rudolf Lutter[1], Jonathan Bortfeldt[1], Katia Parodi[1], and Peter G. Thirolf[1] — [1]Ludwig-Maximilians-Universität München, Germany — [2]King Saud University, Riyadh, Saudi Arabia — [3]Delft University of Technology, The Netherlands — [4]Technische Universität München, Germany

Precise and preferablly online ion beam range verification is a mandatory prerequisite to fully exploit the advantages of hadron-therapy in cancer treatment. Our aim is to develop an imaging system based on a Compton camera designed to detect prompt γ rays induced by nuclear reactions between ion beam and biological tissue. The Compton

camera prototype consists of a stack of double-sided Si-strip detectors (DSSSD) acting as scatterers, while the absorber is formed by a $LaBr_3$ scintillator crystal read out by a position-sensitive multi-anode photomultiplier. The $LaBr_3$ detector was characterized with both absorptive and reflective side-face wrapping materials. Comparative studies of energy and time resolution, photopeak detection efficiency and spatial resolution will be presented together with first tests of the complete camera system.

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HK 64.8 Fr 15:45 HZ 9

Development of the Pion Tracker for HADES spectrometer — •Rafal Lalik for the HADES-Collaboration — Excellence Cluster "Universe", TU München, Boltzmannstr.2, 85748 Garching, Germany

The beam detector for experiments with pion beams at the HADES spectrometer in GSI Darmstadt has been developed. The main goal of this development is to provide efficient event by event reconstruction of secondary pion momenta. Pions are created impacting nitrogen or proton beams on a secondary beryllium target and are then delivered through a chicane to the experimental areas. The expected momentum spread of the secondary pion beam is about 8% whereas simulated resolution of reconstructed momenta is below 0.5%.

The challenging issue is to achieve an accurate measurement (on order of per-mile) of each pion in a high intensity (10^8 part./spill) environment along the pion-bean chicane. This translates into a rate of 10^6 pion/spill with a kinetic energy of 1–2 GeV at the HADES target point.

The tracking system is based on double-sided silicon strips sensors build in radiation hardness technology, and a n-XYTER ASIC front-end readout. The trigger logic is implemented in the TRB3 boards. The whole system is designed as a standalone, easy scalable and portable.

In this talk we are showing status and performance of the system, and recent results obtained in the laboratory and with proton beams at COSY with 2 GeV protons.

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