HK 27: Instrumentation

Zeit: Mittwoch 14:00–16:00 Raum: P 3

Gruppenbericht HK 27.1 Mi 14:00 P 3

The Central Straw Tube Tracker for PANDA — •Marius C. Mertens for the PANDA-Collaboration — Forschungszentrum Jülich GmbH

The PANDA experiment at the future Facility for Antiproton and Ion Research (FAIR) will investigate physics in the open charm energy region using an antiproton beam and a fixed hydrogen target.

A significant part of PANDA's physics program will require the reconstruction of rare channels. Consequently, the experiment is optimized for high luminosities with a quasi-continuous beam, thus the detector must be able to process high particle rates in a continuous manner.

The central tracker of PANDA has the task to precisely measure the traversing particles' tracks as well as their energy loss in order to also contribute to the particle identification information. A Straw Tube Tracker (STT) is under development for PANDA. The detector concept has proven to be a robust device for the track reconstruction already in the COSY-TOF experiment. In PANDA, there will be higher rates and the additional energy loss information which require new readout electronics which is being tested and optimized.

After introducing the design of the PANDA STT, we will present the prototype setup and our most recent results from test measurements.

HK 27.2 Mi 14:30 P 3

Status of studies for luminosity measurement at PANDA detector* — •Anastasia Karavdina[1], Achim Denig[1,2], Miriam Fritsch[1,2], Prometeusz Jasinski[2], Mathias Michel[2], and Tobias Weber[2] for the PANDA-Collaboration — [1]Institut für Kernphysik, Universität Mainz — [2]Helmholtz-Institut Mainz

A good luminosity monitoring is crucial for the PANDA experiment at the planned antiproton accelerator HESR (FAIR, Darmstadt, Germany). For the measurement of the luminosity one can use the elastic antiproton-proton scattering at extreme forward angles. This exploits the fact that the elastic scattering in the range of very small momentum transfer (and thus very small scattering angle) can be calculated exactly from QED. At larger scattering angles the hadronic component of the elastic scattering dominates and this has to be taken from models based on measurements.

The current design for the luminosity monitor are four planes of eight thin double-sided silicon microstrip detectors with trapezoidal shape. The detector itself has an angular acceptance from 3 to 8 mrad and good spatial resolution due to using sensors with high resolution (50 um pitch). There is no particle identification foreseen yet.

In this talk an overview of the basic concept and Monte Carlo based performance studies will be presented. In more detail studies will show which number of ghost tracks and tracks from inelastic reactions are expected in the luminosity monitor and how they can be reduced or suppressed.

*supported by BMBF and HGF

HK 27.3 Mi 14:45 P 3

Neue Ansätze bei der Strahlteilchenidentifikation im COMPASS Experiment — •Tobias Weisrock für die COMPASS-Kollaboration — Institut für Kernphysik der Johannes Gutenberg-Universität Mainz

Der Hadronstrahl des COMPASS Experiments am CERN besteht zu 97% aus Pionen und zu etwa 2,5% aus Kaonen. Zur Auswertung der 2008 und 2009 aufgenommenen Daten sowie im Hinblick auf die für 2012 vorgesehene Primakoff Datennahme ist es notwendig, die Kaonen und Pionen im Hadronstrahl zu identifizieren und zu trennen.

Hierfür stehen zwei Čerenkov-Detektoren zur Verfügung, die mittels einer Blende in der Fokalebene die Čerenkov-Ringe gewünschter Teilchenmasse selektieren. Die Teilchenidentifikation erfolgt üblicherweise über ein einfaches Koinzidenzsignal der Photomultiplier (PM) hinter der Blende.

Hohe Nachweiseffizienzen werden allerdings nur für Strahlteilchen erreicht, die keine große Abweichung von der nominellen Strahlrichtung besitzen. Daher wurde eine Methode entwickelt, die zusätzlich zum PM-Signal auch die Strahldivergenz berücksichtigt. Dieser Ansatz, basierend auf statistischen Verteilungen, wird den einfachen Koinzidenzschnitten gegenübergestellt.

HK 27.4 Mi 15:00 P 3

Production and behavior studies of the new ammonia target for the COMPASS experiment — •Alexander Berlin[1], Sonja Kunkel[1], Stefan Runkel[2], Jonas Herick[1], Christian Hess[1], Werner Meyer[1], and Gerhard Reicherz[1] — [1]Lehrstuhl für Hadronen und Kerne, Ruhr-Universität Bochum — [2]Physikalisches Institut, Universität Bonn

In 2011 the COMPASS experiment at CERN ran with a fresh ammonia target, which was produced by a collaboration between the 'Polarized Target'-groups of Bonn and Bochum.
This new material was mentioned to replace the 16 years old ammonia, which was used in the foregoing experiment, the SMC. A reduced maximum polarisation and longer build-up times were observed in previous runs compared to the run in 1996. So the decision was made to produce fresh target material.
In this talk, the production routine of the target material as well as a comparison to the 16 years old material will be shown. First results from the COMPASS target in 2011 will be presented afterwards.

HK 27.5 Mi 15:15 P 3

Tracking detecors of the BGO-OD experiment — •Jürgen Hannappel for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, D-53115 Bonn

The BGO-OD experiment at the accelerator ELSA in Bonn uses a combination of a BGO crystal spectrometer with a magnetic forward spectrometer for charged particles to investigate multi-particle final states in meson photoproduction.

In 2011 the setup was almost completed and first test data were taken.

In this talk the status of the tracking detectors around the spectrometer magnet is shown, together with first results from the tracking software.

Supported by DFG (SFB/TR-16).

HK 27.6 Mi 15:30 P 3

Photonen Flussmonitor für das BGO-OD Experiment * — •Thomas Zimmermann für die BGO-OD-Kollaboration — Physikalisches Institut, Universität Bonn

Das BGO-OD Experiment, welches zur Zeit an der Elektronen Strecher Anlage ELSA in Bonn die ersten Testdaten nimmt, untersucht systematisch die Photoproduktion von Mesonen am Nukleon. Unter anderem sollen absolute Wirkungsquerschnitte gemessen werden. Dazu ist die Kenntnis des Photonenflusses essentiell, weshalb ein Photonen Flussmonitor in das Experiment integriert wurde.

Der Fluss wird simultan zur Datennahme durch kombination eines total- und eines teilabsorbierenden Detektors gemessen. Zusammen können Photonenraten von bis zu 50 MHz präzise verarbeitet werden.

* gefördert durch die DFG (SFB/TR-16)

HK 27.7 Mi 15:45 P 3

Diamonds are not forever - scCVD radiation damage study with high intensity Au beam in HADES — •Jerzy Pietraszko[1] and Wolfgang Koenig[2] for the HADES-Collaboration — [1]Goethe-Universität, Frankfurt — [2]GSI Helmholtzzentum für Schwerionenforschung GmbH, Darmstadt

Since more than 10 years the HADES group has been involved in the development of diamond detectors based on pcCVD material. These detectors showed very good performance (time resolution below 100 ps sigma) and stable long term operation (over several weeks) at moderate beam (^{12}C) intensities about 10^5 particles/s/cm^2. With the recently finished upgrade of the HADES spectrometer, aimed at preparing for experiments at SIS-100 at the future FAIR facility, the DAQ performance was significantly increased allowing for high intensity beams. The upcoming Au+Au experiment, scheduled for 2012, will utilize an Au beam at intensities between 2-5*10^6 Au ions/s. Due to the requested very small target diameter, 2.2 mm, the HADES beam focus system has to provide a beam spot below 2mm^2 in the HADES focal point. During a recently conducted five day long test experiment at this beam intensity we have reached a total particle dose close to 2.37 * 10^{13} Au ions/cm^2 on our diamond start detector which was never archived before. By analysing the surface of the detector and properties like signal amplitude and time resolution we have identified

significant radiation damage. In this talk the observed effects will be discussed. *This work has been supported by BMBF (06 FY 9100 I), HIC for FAIR, EMMI and GSI