HK 85: Accelerators and Instrumentation II

Time: Friday 11:00–12:45 Location: H-ZO 90

HK 85.1 Fr 11:00 H-ZO 90

Erzeugung eines spinpolarisierten Elektronenstrahls für die Beschleunigeranlage ELSA — •Dominik Heiliger — Physikalisches Institut der Universität Bonn, Deutschland

Spinpolarisierte Elektronen werden durch Bestrahlung einer lokal gitterverzerrten Mehrschichten-Photokathode (strained layer superlattice crystal) mit zirkular polarisiertem Laserlicht erzeugt. Bei geeigneter Bedampfung der Oberfläche der Photokathode lässt sich eine sogenannte negative Elektronenaffinität erzeugen und die Elektronen können den Kristall verlassen. Ein Elektronenstrahl wird durch Beschleunigung auf 50kV mittels einer invertiert aufgebauten Elektrodenanordnung erzeugt. Die Verschmutzung der Kristalloberfläche wird durch einen Betrieb der Anordnung im extremen Ultrahochvakuum unterdrückt. Dieses wird durch einen geeiget aufgebauten Transferkanal vom moderaten Vakuum des Linearbeschleunigers getrennt. Der Transferkanal ist so konzipiert, dass eine möglichst verlustfreie Transmission sowie eine Drehung des Spinvektors in eine zur Flugrichtung des Elektronenstrahls transversale Richtung möglich ist. Durch Diagnosestationen können Strahllage und Strahlprofil innerhalb des Transferkanals bestimmt werden. Im Vortrag werden die Funktionsweise der Quelle für polarisierte Elektronen erläutert sowie Messungen des erreichbaren Emissionsstroms und des Strahlprofils vorgestellt.

HK 85.2 Fr 11:15 H-ZO 90

Using NEG-pumping near a high density internal target — •Alexander Gruber[1], Johann Marton[1], Eberhard Widmann[1], Johann Zmeskal[1], and Herbert Orth[2] for the PANDA-Collaboration — [1]Stefan Meyer Institut für subatomare Physik, ÖAW — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

The universal detector PANDA will be constructed at the future high-energy antiproton storage ring HESR at FAIR (Facility for Antiproton and Ion Research, GSI/Darmstadt). It will use antiproton beams (1.5 to 15 GeV/c) for hadron physics in the charmonium region.

The Stefan Meyer Institut (SMI) contributes to major parts of the PANDA detector like the hydrogen cluster-jet target and the vacuum system of the antiproton - target interaction zone.

To ensure low background, the residual gas load in the interaction zone and in the antiproton beam-pipe has to be minimised. Most of the gas load will come from the high density internal hydrogen target. As the detector will cover almost the full solid angle, the installation of pumps near the interaction zone is impossible. Therefore the use of NEG (non-evaporative-getter) coated beam pipes has been considered as an alternative.

Two setups with NEG coated tubes have been installed at SMI as prototypes of the PANDA interaction zone. General parameters of the NEG-film, its outgassing behaviour, the pumping speed and the pumping capacity for hydrogen have been tested.

The results of the studies on the PANDA-interaction region will be presented.

HK 85.3 Fr 11:30 H-ZO 90

Prototype of a High Density Cluster-Jet-Target for PANDA — •Alexander Täschner, Alfons Khoukaz, Esperanza Köhler, Hans-Werner Ortjohann, and Tobias Rausmann — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Wilhelm-Klemm-Str. 9, D-48149 Münster

Cluster-jet-targets are operated successfully since many years as internal targets for storage ring experiments. In order to utilize these targets for upcoming 4π-detectors like the PANDA detector at FAIR, cluster-jet sources have to be improved with respect to the maximum target thickness to allow for highest luminosities in combination with larger distances between the cluster source and the interaction region. At the University of Münster the prototype of the cluster-jet target station for PANDA has been built which allows for systematic studies on the production and the properties of high-density cluster-jet beams.

In this contribution we will discuss recent results on the achieved target density. Furthermore we will present recent measurements on the velocity and the mass distribution of the produced cluster beams and studies on the target integration into the PANDA detector.

Supported by EU (RII3-CT-2004-506078) and BMBF (06MS253I).

HK 85.4 Fr 11:45 H-ZO 90

Performance of the WASA-at-COSY Pellet Target — •Florian Bergmann[1], Alfons Khoukaz[1], Guido D'Orsaneo[2], Annika Passfeld[1], Tobias Rausmann[1], Dirk Spölgen[2], and Alexander Winnemöller[1] — [1]Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Wilhelm-Klemm-Str. 9, D-48149 Münster, Germany — [2]Institut für Kernphysik and Jülich Center for Hadron Physics, Forschungszentrum Jülich, D-52425 Jülich, Germany

After several years of operation at the CELSIUS ring in Uppsala, the experimental setup WASA has been moved to the COSY synchrotron of the FZ Jülich and is operated since 2006 as the WASA-at-COSY facility. One important part of this experimental installation is the pellet target device, which is the first and only one operated at storage rings. It provides high effective areal target beam densities of $\rho \approx 5 \cdot 10^{15} \frac{\text{atoms}}{\text{cm}^2}$ and is operated with hydrogen and deuterium as target material. Thus luminosities above $L = 10^{31}$ cm^{-2}s^{-1} can be achieved, allowing e.g. precision measurements on rare meson decays. Since the quality of the obtained data crucially depends on the perfomance of the pellet target, special efforts have been undertaken to provide high quality pellet beams. Of particular importance are the vacuum conditions in the scattering chamber, the regularity of the pellet flow or the long term stability of the complete target system.

In this contribution we will present the performance of the pellet target, which will also be of interest for future experimental facilities.

Supported by FZ Jülich, BMBF, and Wallenberg Foundation.

HK 85.5 Fr 12:00 H-ZO 90

The Liquid Hydrogen Target of the Crystal-Barrel/TAPS-Experiment at ELSA — •Christian Hammann for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen-und Kernphysik, Nußallee 14-16, D-53115 Bonn

The Crystal-Barrel/TAPS-experiment at the electron-accelerator ELSA is a photoproduction experiment investigating the spectrum and the properties of hadrons. The experiment features an electromagnetic calorimeter with nearly 4π angular coverage. The setup is especially suited for the detection of multi-photon final states.

For measurements on the nucleon a liquid hydrogen/deuterium target is available. The target is build such that the amount of material around the target cell is minimized to avoid conversion of photons, the loss of low energy protons and the production of electromagnetic background.

As the center of the Crystal Barrel detector is only accessible horizontally along the beam axis the target must have a rather long horizontal support pipe. This required the usage of two liquid hydrogen systems connected by a heat exchanger. An advantage for the operation with liquid deuterium is that only the smaller gas system needs to be filled with deuterium.

In this talk the liquid hydrogen target which was successfully used in several beamtimes will be presented.

Supported by the Deutsche Forschungsgemeinschaft (SFB/TR16).

HK 85.6 Fr 12:15 H-ZO 90

Online control package for COSY-TOF experiment — •Ekaterina Borodina[1,2], Eduard Roderburg[1], and James Ritman[1] for the COSY-TOF-Collaboration — [1]Institute fuer Kernphysik I, Forschungszentrum Juelich GmbH, 52325, Juelich, Germany — [2]Moscow State Institute of Electronics and Mathematics, Russia

The new Straw Tube Tracker and Quirl Microstrip detectors have been installed at the TOF (Time Of Flight) experiment at the COSY accelerator in IKP FZ-Juelich. These new detectors increase the number of channels of the COSY-TOF detector by about a factor of 3. Therefore, a new control package to adjust electronic parameters and for control the proper functionality of all channels is being developed.

The online controlling based on visualization of key parameters of detectors plays an important role. The concept and the techniques of the online software package are developed for the COSY-TOF experiment. It consists of conversion software, which transforms a binary data stream from the DAQ to detector oriented event format, methods of IPC (Inter-Process Communications), and GUI (graphical user interface). To achieve data transfer through the network and real time data performance the IPC tools - sockets and shared memory are used. A special GUI, TOF-ONLINE has been developed, based on ROOT. The GUI allows the detectors, plotting spectra, resetting data, etc., to be selected in an intuitive way. Examples of the visualization and the results of the first beam time will be introduced. Supported in part by FZ-Juelich.

HK 85.7 Fr 12:30 H-ZO 90

Studies on SiPM radiation hardness and low light level detection — •Salvador Sanchez, Patrick Achenbach, and Josef Pochodzalla for the A1-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz

A tracking detector based on two meters long scintillating fibers read out by silicon photomultipliers (SiPM) is being developed for the Kaos spectrometer at the Mainz Microtron MAMI. Low light level detection is challenging for these devices due to their high dark count rate. A relatively large cross-section of 4 mm^2 has been chosen as the optimum value for a minimal particle trajectories disturbance and a maximum detection efficiency. 100% detection efficiencies has been measured with an experimental prototype read out by a SSPM-0606BG4MM-PCB Photonique device at accidental coincidence rates of only a few Hertz. Because of the detectors close proximity to the intense electron beam a study of noise and radiation damage has been performed. SiPM have been irradiated with 14 MeV electron and exposed to mixed radiation in the experimental area. It is shown that the first noticeable damage consists of an increase in the rate of dark pulses and the loss of uniformity in the pixel gains. Realistic amounts of shielding have been tested and found to have only a relatively poor performance. Annealing has been proved to be only partially effective for SiPM recovery.