HK 60: Instrumentation XVII and Accelerators

Zeit: Freitag 14:00–15:45 Raum: Audimax H1

Gruppenbericht HK 60.1 Fr 14:00 Audimax H1

The MAGIX experiment: the most recent developments — •Sabato Stefano Caiazza for the MAGIX-Collaboration — Intitut für Kernphzsik - Johannes Gutenberg Universität, Mainz, Deutschland

The new MESA accelerator under development at the Institute for Nuclear Physics in Mainz is planned to be commissioned at the beginning of the new decade. By that time, the MAGIX experiment, which will sit on the energy recover line of the accelerator. Therefore MAGIX will use an innovative jet-target system coupled without windows with a couple of magnetic spectrometers. In the focal plane of those spectrometers we will install a GEM-based tracker. Additionally we will integrate a recoil detector in the scattering chamber and a luminosity and zero-degree in the forward direction. All the instrumentation is currently under development and the most recent updates will be presented in this talk.

HK 60.2 Fr 14:30 Audimax H1

Kohlenstofffasern als Primärtarget bei $\overline{\text{P}}$ANDA — •Birte Sauer[1], Patrick Achenbach[1,2], Sebastian Bleser[1], Michael Bölting[1], Josef Pochodzalla[1,2], Falk Schupp[1], Marcell Steinen[1] und Christian Tiefenthaler[1] — [1]Helmholz-Institut Mainz — [2]Institut für Kernphysik Mainz

Einer der Schwerpunkte des PANDA-Experiments wird die γ-Spektroskopie von Doppel-Λ-Hyperkernen sein. Dazu ist eine Modifikation des Standard-PANDA-Detektors nötig. Diese besteht unter anderem aus einem speziellen internen Kohlenstofftarget. Dazu wird das dediziertes Tagetsetup unmittelbar vor dem zentralen Detektor eingebaut. Alle Komponenten des Aufbaus müssen im starken Magnetfeld und im hohen Teilchenfluss innerhalb des PANDA-Detektors betrieben werden können.
Dieser Beitrag zeigt den aktuellen Entwicklungsstand des Primärtargets, mit Fokus auf der dafür verwendeten Kohlenstofffaser. Insbesondere wird dabei auf die Eignung der Faser eingegangen.

HK 60.3 Fr 14:45 Audimax H1

Studies on Laval Nozzles for the $\overline{\text{P}}$ANDA Cluster-Jet Target — •S. Grieser, D. Bonaventura, B. Hetz, and A. Khoukaz for the PANDA-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

The $\overline{\text{P}}$ANDA experiment (antiProton ANnihilation at DArmstadt) at the future accelerator facility FAIR (Facility for Antiproton and Ion Research) will focus on investigations on the strong interaction and on questions about hadronic matter. Therefore, a cluster-jet target as an internal target was designed and built up at the University of Münster. Such a target achieves high and constant beam thicknesses, which can be adjusted over several orders of magnitude during operation. By the expansion of pre-cooled gases within fine Laval nozzles a cluster source produces a continous flow of cryogenic solid clusters. The geometry of the Laval nozzle determines the production and the properties of the clusters. In the past, at the University of Münster an improved production process for Laval nozzles with their complex inner geometry was developed and first Laval nozzles were successfully produced and operated. The production of Laval nozzles ensures the operation of cluster-jet targets, e.g. for the $\overline{\text{P}}$ANDA or the MAGIX@MESA experiment, and opens the way for studies on the optimisation of these nozzles to match the required target performance. Measurements and their results with the new nozzles at the $\overline{\text{P}}$ANDA cluster-jet target prototype will be presented and discussed.

HK 60.4 Fr 15:00 Audimax H1

Magnetically-coupled piston pump for ultra-clean noble gas experiments — •Denny Schulte — Westfälische Wilhelms-Universität, Münster, Germany

Experiments employing noble gas targets such as xenon and argon make use of the characteristic ionization and scintillation process occurring in case of an interaction. In order to enable high light as well as charge yields, electronegative impurities have to be removed from the inert gas. A continuous circulation through a purification system is indispensable and requires specialized pumps.

For this reason, together with partners from Stanford University and Rensselaer Technical Institute we developed a magnetically-coupled piston pump, which fulfills all important requirements for current as well as future multi-ton and low background experiments (e.g. XENONnT and nEXO) such as absence of oil-based lubrication, ultra-low radon emanation and high performance.

An enhanced magnetic gradient boosts the coupling strength of the piston to 3500 N. Thus, gas flows of more than 200 standard liters per minute and compressions of up to 1.9 bar are possible.

This talk will zoom in on characterization and last upgrades of the pump and is supported by BMBF under contract 05A17PM2.

HK 60.5 Fr 15:15 Audimax H1

Beam and Vacuum Studies of the $\overline{\text{P}}$ANDA Cluster-Jet Target — •Benjamin Hetz, Daniel Bonaventura, Silke Grieser, Ann-Kathrin Hergemöller, and Alfons Khoukaz for the PANDA-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

The internal cluster-jet target build up at the University of Münster will be the phase one target for the upcoming $\overline{\text{P}}$ANDA experiment at the antiproton storage ring HESR at FAIR. This cluster-jet target in close to final $\overline{\text{P}}$ANDA geometry is by now successfully set into operation, including the final vacuum and beam monitor systems and the final beam dump of the $\overline{\text{P}}$ANDA experiment. Thicknesses of more than 2×10^{15} atoms/cm^2 in distances of 2.25 m away from the cluster-jet generator demonstrate the benefits of Münster cluster-jet targets for high luminosity 4π experiments which require a constant thickness in time.
The current results of the $\overline{\text{P}}$ANDA target thickness and vacuum studies in Münster will be presented. This includes the results of different beam monitor systems, i.e. destructive and non-destructive systems, realized at different vacuum chambers along the jet beam path into the beam dump of the $\overline{\text{P}}$ANDA target. Furthermore, the vacuum conditions at different stages of the jet beam line and the gas back flow rates of the $\overline{\text{P}}$ANDA beam dump will be discussed.
Additionally, a preview of the planed 2018 beam time with the $\overline{\text{P}}$ANDA cluster-jet target at the COSY accelerator in Jülich will be given.

HK 60.6 Fr 15:30 Audimax H1

Zur Minimierung des Ankunftszeitjitters für lasergetriebene Plasma-Wakefield-Beschleuniger — •Stefano Mattiello[1], Holger Schlarb[2] und Andreas Penirschke[1] — [1]Technische Hochschule Mittelhessen, Friedberg, Deutschland — [2]DESY, Hamburg, Deutschland

Für laserbetriebene Plasma-Wake-Feld-Beschleuniger (PWA) ist die Synchronisation der Elektronenpakete zum plasmatreibenden Laserpuls im Bereich einiger Femtosekunden notwendig, damit eine stabile Beschleunigung erfolgen kann. Zur Minimierung des Ankunftszeitjitters des extern injektierten Elektronenstrahls wird in diesem Projekt ein neuartiges Feedbacksystem mit einer angestrebten zeitlichen Auflösung von 1fs entwickelt, welches mit Hilfe des plasmatreibenden Laserstrahles THz-Pulse erzeugt, die direkt auf den Elektronenstrahl zurückkoppeln, um diesem eine Energiemodulation zu induzieren.

Die Erzeugung der THz-Pulse soll durch die optische Rektifikation des hochenergetischen Femtosekunden-Laserstrahls mittels eines nichtlinearen Kristalls erfolgen. Die Wahl des geeigneten Kristalls ist entscheidend für eine effiziente und stabile THz-Generation. In diesem Beitrag untersuchen wir systematisch den Einfluss der optischen Eigenschaften des Kristalls, und insbesondere des Absorptionskoeffizienten von Lithiumniobat auf die Effizienz der Erzeugung der THz-Pulse.