HK 52 Instrumentation und Anwendungen

Zeit: Donnerstag 17:00–18:30 Raum: H

HK 52.1 Do 17:00 H

Design and optimization of the MAC-E-Filter of the neutron decay spectrometer ***a*****SPECT** — •Raquel Muñoz Horta[1], Heinz Angerer[2], Fidel Ayala Guardia[1], Stefan Baessler[1], Michael Borg[1], Klaus Eberhardt[3], Ferenc Glück[1], Werner Heil[1], Igor Konorov[1], Gertrud Konrad[2], Naika Luquero Llopis[1], Marius Orlowski[1], Gerd Petzoldt[2], Dennis Rich[4], Martin Simson[2], Yuri Sobolev[1], Hans-Friedrich Wirth[2], and Oliver Zimmer[2] — [1]Institut für Physik, Universität Mainz — [2]Physik Department E18, TU München — [3]Institut für Kernchemie, Universität Mainz — [4]Forschungsreaktor FRM-II, München

The aim of the spectrometer *a*SPECT is to measure an integrated proton spectrum from free neutron decay. This provides a value of the neutrino electron correlation coefficient a, obtaining information for a unitarity test of the Cabbibo-Kobayashi-Maskawa-Matrix. The design of the retardation spectrometer *a*SPECT is based on Magnetic Adiabatic Collimation followed by an Electrostatic Filter (MAC-E-Filter). With this system, protons produced in free neutron decay are guided towards the detector by magnetic field lines. On their way, they are adiabatically collimated, i.e. their momenta are aligned parallel to the field lines. Then, an electrostatic barrier is applied which allows only the protons with sufficient energy to pass and to be detected. By applying different voltages at the electrostatic barrier of the MAC-E-Filter one measures the integrated energy spectrum of the protons. The main working principle of the MAC-E-Filter, its implementation and its optimization in the *a*SPECT spectrometer are presented.

HK 52.2 Do 17:15 H

Polarized 3He targets at MAMI-C — •Jochen Krimmer[1], Werner Heil[1], and Patricia Aguar-Bartolomé[2] for the A1 collaboration and the A2 collaboration — [1]Institut für Physik, Universität Mainz — [2]Institut für Kernphysik, Universität Mainz

With the new acceleration stage MAMI-C, electrons up to 1.5 GeV will be available for experiments with real and virtual photons. Upcoming experiments with polarized 3He gas targets will include e.g. measurements for meson photoproduction and the electric form factor of the neutron. 3He gas is polarized via metastability exchange optical pumping. The polarizer in Mainz can reach a polarization of 75% at a production rate of 2 bar*l/h. Recent results from materialtests for the target vessels will be shown. Furthermore, an improved understanding of the wall relaxation processes will be presented.

HK 52.3 Do 17:30 H

Commissioning of the Polarized Internal Gas Target of ANKE at COSY — •Kirill Grigoryev[1,2], R. Engels[2], F. Klehr[3], B. Lorentz[2], M. Mikirtytchiants[1], S. Mikirtytchiants[1], D. Prasuhn[2], F. Rathmann[2], J. Sarkadi[4], H. Seyfarth[2], H. Stroeher[2], and A. Vasilyev[1] for the ANKE collaboration — [1]PNPI, Gatchina, Russia — [2]IKP, FZ Jülich, Germany — [3]ZAT, FZ Jülich, Germany — [4]ZEL, FZ Jülich, Germany

For future few-nucleon interactions studies with polarized beams and targets at COSY-Jülich, a polarized internal storage cell gas target is currently being developed and was implemented at ANKE in summer 2005. At present first commissioning of ABS at ANKE was carried out and some improvements of the system have been done. At the same time storage cell tests at ANKE for determination of the COSY beam dimensions have been performed and in February 2005 a first prototype of the storage cell was implemented at ANKE. The prototype was made from pure aluminum foil and covered with PTFE suspension. In November 2005 tests with a storage cell at ANKE at COSY with use of polarized hydrogen beam from the ABS, electron cooling and stacking of the COSY beam at different deflection angles of the ANKE spectrometer magnet were carried out. The average luminosity was about $5*10^{29} cm^{-2}s^{-1}$. Results of these tests will be presented.

HK 52.4 Do 17:45 H

Development of High Density Cluster-Jet-Targets for Storage Ring Experiments — •Alexander Täschner, Alfons Khoukaz, Hans-Werner Ortjohann, Jennyfer Otte, and Tobias Rausmann — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, D-48149 Münster

Cluster-jet-targets are operated successfully since many years as internal targets for storage ring experiments. Main advantages of this windowless type of target are a density distribution which is homogeneous and constant in space and time, an extreme high purity of the target beam and an easy possibility to adjust the density and therefore the luminosity of the experiment by orders of magnitude in realtime.

However, in order to utilize these advantages for new types of detector systems with 4π-geometry like the PANDA detector at the upcoming FAIR at GSI, cluster-jet sources have to be improved with respect to the maximum target density to allow for highest luminosities in combination with larger distances between the cluster source and the interaction region.

For this purpose a cluster-jet target station has been build up at the University of Münster which covers the required spatial requirements of a future 4π-detection system. This target station allows for systematic studies on the production of high-density cluster-jet beams. Recent modifications resulted in significantly increased target densities compared to hitherto existing cluster targets. The used experimental methods will be discussed and present results will be presented.

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HK 52.5 Do 18:00 H

MATS - Measurements with an Advanced Trapping System at the future GSI facility FAIR — •Klaus Blaum[1,2] and Frank Herfurth[1] for the MATS collaboration — [1]GSI Darmstadt, Planckstraße 1, 64291 Darmstadt, Germany — [2]Institut für Physik, Johannes Gutenberg-Universität Mainz, 55099 Mainz, Germany

The mass and its inherent connection with the nuclear binding energy is one of the fundamental properties of a nuclide. Thus, precise mass values are important for a variety of applications, ranging from nuclear-structure studies like the investigation of shell closures and the onset of deformation, the verification of nuclear mass models and mass formulas, to tests of the weak interaction and of the Standard Model. The required relative accuracy ranges from 10^{-5} to below 10^{-8} for radionuclides, which most often have half-lives well below 1 s. Substantial progress in Penning trap mass spectrometry has made this method a prime choice for precision measurements on rare isotopes. The technique is well suited to provide high accuracy and sensitivity even for short-lived nuclides. Furthermore, ion traps offer advantages when used for precision decay studies. With MATS at FAIR we aim for applying both techniques to short-lived radionuclides: High-precision mass measurements and in-trap conversion electron and alpha spectroscopy. The experimental setup of MATS is a unique combination of an electron beam ion trap for charge breeding, ion traps for beam preparation, and a high precision Penning trap system for mass measurements and decay studies. MATS will be setup in the low energy branch of the super FRS, that makes thermalized products of fragmentation reactions available with high purity.

HK 52.6 Do 18:15 H

First on-line test of the FRS Ion Catcher with relativistic nickel fragments — •M. Petrick[1], K.-H. Behr[2], A. Brünle[2], L. Caceres[2], J. Clark[3], Z. Di[1], S. Elisseev[2], M. Facina[4], A. Fettouhi[2], H. Geissel[2], W. Hüller[2], M. Huyse[4], C. Karagiannis[2], B. Kindler[2], R. Knöbel[2], Y. Kudrayavtse[4], J. Kurcewicz[2], T. Levant[3], Yu.A. Litvinov[2], B. Lommel[2], M. Maier[2], D. Morrissey[5], G. Münzenberg[2], W.R. Plass[1], M. Portillo[5], G. Savard[3], C. Scheidenberger[2], P. Van Duppen[4], H. Weick[2], M. Winkler[2], and B. Zabransky[3] for the FRS Ion-Catcher collaboration — [1]JLU, Giessen — [2]GSI, Darmstadt — [3]Argonne Nat. Lab. — [4]Katho. Uni. Leuven — [5]MSU

A key element of the Low-Energy-Branch of the FAIR-facility will be the energy buncher and the stopping cell for in-flight separated exotic nuclei. This device will provide high quality beams of short-lived nuclei for high precision experiments such as decay spectroscopy, direct mass measurements and laser-spectroscopy. For the first time the FRS Ion-Catcher was tested in an on-line experiment. 200 MeV/u projectile were produced by fragmentation of a 58Ni-beam in an AL target, stopped in a helium-filled gas cell and extracted with a few eV through a RF-quadrupol ion distribution system, which allowed to connect a silicon surface barrier detector and a time-of-flight mass spectrometer. In the experiment, the efficiency of the setup, molecule and aduct-formation in and extraction times from the gas cell were investigated. As a proof-of-principle, the half-life of 54 Co was determined. In this presentation an overview of the experiment run and its results will be given.