HK 48: Poster

Time: Wednesday 17:00–19:00 Location: C/Foyer

HK 48.1 Wed 17:00 C/Foyer

Studies on the reaction pd → ^{3}Heπ^0 at WASA-at-COSY* — •Karsten Sitterberg, Nils Hüsken, Florian Bergmann, Kay Demmich, and Alfons Khoukaz — Institut für Kernphysik, WestfälischeWilhelms-Universität Münster, Germany

The limited database for the total cross sections of the pd → ^{3}Heη reaction presents unexpected fluctuations in the excess energy range of 20-60 MeV. In order to examine these variantions and to look for an underlying structure in the cross sections, a beam time at the WASA-at-COSY installation was performed in May 2014. The 15 different momenta for the proton beam used ranged from $p_p = 1.60\,\mathrm{GeV/c}$ to $p_p = 1.74\,\mathrm{GeV/c}$, i.e. $Q = 13.6\,\mathrm{MeV}-80.9\,\mathrm{MeV}$ for the ^{3}Heη-reaction. In order to obtain total and differential cross sections, the luminosities for the different beam momenta have to be determined. This can be done via the reconstruction of the normalisation reaction pd → ^{3}Heπ^0 and its angular distributions.
First analysis results of the data obtained at the WASA-at-COSY beam time will be presented and discussed.

*Supported by FFE program of the Forschungszentrum Jülich and the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n 283286.

HK 48.2 Wed 17:00 C/Foyer

Measurement of polarization observables in $2\pi^0$-photoproduction off the proton with the CBELSA/TAPS-experiment — Philipp Mahlberg and •Tobias Seifen for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Nussallee 14-16, 53115 Bonn

One important step in understanding the baryon spectrum is a precise knowledge of the excited states and their decays. In order to extract the contributing resonances from experimental data a partial wave analysis needs to be performed. To resolve ambiguities, the measurement of polarization observables is indispensable. In the regime of high mass baryon resonances multi-meson final states are of particular importance. Here sequential decays of resonances are observed.

The Crystal Barrel/TAPS experiment is ideally suited to measure the photoproduction of neutral mesons decaying into photons due to its good energy resolution, high detection efficiency for photons, and the nearly complete solid angle coverage. In combination with a longitudinally or transversely polarized target and an energy tagged, linearly or circularly polarized photon beam the experiment allows the measurement of a large set of polarization observables.

Preliminary results on the reaction $\vec{\gamma}\vec{p} \to p\pi^0\pi^0$ obtained with a transversely as well as with a longitudinally polarized target will be presented.

Supported by the Deutsche Forschungsgemeinschaft (SFB/TR16).

HK 48.3 Wed 17:00 C/Foyer

Messung des Beitrags der Strange-Quarks zu den Vektor-Formfaktoren des Protons bei Q^2=0.1(GeV/c)^2 — •Boris Gläser[1], David Balaguer Rios[1], Sebastian Baunack[1], Dominik Becker[1], Jürgen Diefenbach[1], Dietrich von Harrach[1], Yoshio Imai[1], Jeong Han Lee[1,4], Frank Maas[1,2,3], Maria Carmen Mora Espi[1], Roberto Perez Benito[1], Ernst Schilling[1] und Iris Zimmermann[1] für die A4-Kollaboration — [1]Institut für Kernphysik, Johannes Gutenberg-Universität Mainz — [2]Helmholtz-Institut Mainz — [3]PRISMA Cluster of Excellence, Johannes Gutenberg-Universität Mainz — [4]Institute for Basic Science, Daejeon, Korea

Die A4-Kollaboration am Elektronenbeschleuniger MAMI der Johannes Gutenberg-Universität Mainz befasst sich mit der Untersuchung der Strange-Quark-Beiträge zu den Vektor-Formfaktoren des Nukleons. Hierzu wurde die paritätsverletzende Asymmetrie in der elastischen Streuung longitudinal polarisierter Elektronen an unpolarisierten Protonen vermessen. Der Nachweis der gestreuten Elektronen erfolgte mit einem segmentierten PbF_2-Kalorimeter, das sowohl für Messungen unter Vorwärts- als auch unter Rückwärtsstreuwinkeln eingesetzt wurde. Messungen bei konstantem Impulsübertrag aber unterschiedlichem Streuwinkel ermöglichen die unabhängige Bestimmung des seltsamen elektrischen und seltsamen magnetischen Formfaktors. Die letzte Messung der A4-Kollaboration wurde 2012 abgeschlossen. Der Beitrag stellt den aktuellen Datenpunkt für Messungen bei einem Impulsübertrag von 0.1(GeV/c)^2 unter Rückwärtsstreuwinkeln vor.

HK 48.4 Wed 17:00 C/Foyer

Technical Development of the Backward End-Cap (BWEC) for the PANDA Electromagnetic Calorimeter (EMC) — •Roserio Valente[1,2], Heybat Ahmadi[1,2], Samer Ahmed[1], Luigi Capozza[1,3], Alaa Dbeyssi[1,3], Malte Deiseroth[1,2], Bertold Fröhlich[1,3], Dmitry Kahneft[1,2], Dexu Lin[1,3], Frank Maas[1,3], María Carmen Mora Espí[1,3], Cristina Morales Morales[1,3], Oliver Noll[1,2], David Rodríguez Piñeiro[1,3], Manuel Zambrana[1,2], and Iris Zimmermann[1,3] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz — [2]Johannes Gutenberg-Universität Mainz — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt

The Backward End-Cap (BWEC) of the PANDA Electromagnetic Calorimeter (EMC) will be placed upstream of the interaction point. In this region several other sub-detectors, that operate at different working conditions, are assembled and inserted into PANDA solenoid cavity. This constitutes a challenge for the structural and functional development of the BWEC, since the solid angle coverage with lead tungsten crystals needs to be maximized to meet the physics case requirements. Thanks to a profitable collaboration with the neighbor sub-detector groups, the BWEC 3D design has been constantly updated to take into account the constraints of the experiment. The design of parts, such as the BWEC support, insertion trolley, cooling network and service routing were optimized. In parallel, studies are being done to validate the pressure drop and heat distribution inside the cold volume as well to validate the mechanical stability of the supporting parts.

HK 48.5 Wed 17:00 C/Foyer

Proton Time-like Electromagnetic Form Factor Measurements with the ISR Method at BESIII-experiment — •Dexu Lin[1,2], Samer Ali Nasher Ahmed[1,2], Alaa Dbeyssi[1], Paul Larin[1], Frank Maas[1,2,3], Cristina Morales[1], and Christoph Rosner[1,2] — [1]Helmholtz-Institut Mainz, 55128 Mainz, Germany — [2]Institut für Kernphysik, Johannes Gutenberg Universität Mainz, 55099 Mainz, Germay — [3]PRISMA Cluster of Excellence, Johannes Gutenberg Universität Mainz, 55099 Mainz, Germay

The structure of the proton can be understood through the study of its electromagnetic (EM) form factors. Electron scattering experiments have allowed to explore, with a high accuracy, the proton EM form factors in the space-like region. Due to the low luminosity achieved up to now, few data exist on the proton form factors in the time-like region and only a very coarse determination of the individual electric and magnetic form factors (or its ratio) has been possible so far.

BESIII (Beijing Spectrometer III) at BEPCII (Beijing Electron Positron Collider II) is collecting large data samples at J/Ψ, Ψ″ and XYZ energy range. These data can be used to measure proton EM form factors using Initial-State-Radiation (ISR) events with the process $e^+e^- \to p\bar{p}\gamma_{ISR}$. In this poster, the status of proton EM form factors analysis in time-like regeion with the data from around 4 GeV center of mass energy will be summarized together with a discussion of the background substraction procedure.

HK 48.6 Wed 17:00 C/Foyer

High precision determination of the weak mixing angle at the future P2-experiment at the MESA-accelerator in Mainz — •Dominik Becker[1], Kathrin Gerz[1], Sebastian Baunack[1], Krishna S. Kumar[2], and Frank E. Maas[1,3,4] — [1]Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Germany — [2]University of Massachusetts Amherst, Massachusetts, USA — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [4]Helmholtz-Institut Mainz, Johannes Gutenberg-Universität Mainz, Germany

The goal of Project P2 is to determine the electroweak mixing angle $\sin^2(\theta_W)$ to a precision of better than 0.15 % at low momentum transfer (Q^2 = 0.003 GeV^2). The experiment will be carried out at the upcoming MESA accelerator facility in Mainz. MESA is a superconducting energy recovering linear accelerator for electrons up to 155 MeV.

The experimental method comprises a measurement of the proton's weak charge Q_W^p to a relative uncertainty of 1.9 % via measurement

of the parity violating asymmetry in elastic electron-proton scattering. In our poster, we are going to present the experimental method and discuss the achievable precision in the determination of the weak mixing angle. We also show results of Geant4 simulations which were carried out to study the experimental setup. A solenoid magnet with 2 pi azimuthal acceptance will be employed together with a 60 cm hydrogen target. The high luminosity is necessary to get the required statistical precision at the 8 $\times 10^{-9}$-level.

HK 48.7 Wed 17:00 C/Foyer

Development of a Prototype for the Backward End-Cap for the PANDA Electromagnetic Calorimeter at FAIR — Heybat Ahmadi[1], Samer Ahmed[2], Luigi Capozza[3], Alaa Dbeyssi[3], Malte Deiseroth[1], Bertold Fröhlich[3], Dmitry Khaneft[1], Dexu Lin[3], Frank Maas[3], María Carmen Mora Espí[3], Cristina Morales Morales[3], •Oliver Noll[1], David Rodríguez Piñeiro[3], Roserio Valente[1], Manuel Zambrana[1], and Iris Zimmermann[3] — [1]UNI-MAINZ/HIM — [2]HIM — [3]HIM/GSI

We have developed a prototype (PROTO16) for the backward end-cap (BWEC) of the PANDA electromagnetic calorimeter. The aim has been to test as much as possible the final details concerning crystal read out and insulation system of the BWEC. This ranges from equipping the scintillator material lead tungstate (PWO) with large area avalanche photodiodes (APDs) and ASIC-Preamplifiers (APFEL) of the last generation to the insulating material of Vacuum-Insulation-Panels (VIP) and Aerogel up to a fully executable slow control- and data acquisition system. Moreover innovative methods for subsystems like the high precision calibration system for thermal sensors have been realized reaching a new level of accuracy. Due to the high light yield variation of PWO with temperature this is an important ingredient to reach the required good energy resolution. As a result, it is possible to monitor relative and absolute temperature differences in the prototype with a precision of 0.1 °C. The prototype has been tested at the tagged photon beam of the MAMI electron accelerator in Mainz in July 2014. Design concept, realization and test results will be presented.

HK 48.8 Wed 17:00 C/Foyer

Towards Measuring the Electromagnetic Structure of η' Mesons with the CLAS g12 Experiment — •Michaela Schever for the CLAS-Collaboration — RWTH Aachen — Forschungszentrum Jülich

The CLAS g12 experiment was performed with a tagged Bremsstrahlung photon beam using the 6 GeV electron beam from the CEBAF accelerator at Jefferson Lab, USA. We report on the Monte Carlo simulations being performed in order to support the CLAS approved analysis for light meson decays from existing data sets of the g12 experiment.

The specific goal of the effort described here is to look for events from the Dalitz decay $\eta' \to \gamma e^+ e^-$ and the possibility to deduce the electromagnetic transition form factor of the η' meson. This would be achieved by comparing the measured dilepton invariant mass distribution with the QED calculation. It is expected that the resulting form factor dominantly displays the line shape of an intermediate vector meson, according to models based on vector meson dominance. So far, experimental results have suffered from a lack of statistics. Along with the actual data analysis, it is essential to model possible background contributions form competing decay channels as well as the contamination from external conversion processes.

HK 48.9 Wed 17:00 C/Foyer

Investigations of $\eta \to \pi^0 e^+ e^-$ with WASA-at-COSY in the light of C-violation and physics beyond SM* — •Kay Demmich, Florian Bergmann, Nils Hüsken, Karsten Sitterberg, and Alfons Khoukaz for the WASA-at-COSY-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Germany

The decay $\eta \to \pi^0 e^+ e^-$ is a perfect probe for testing the conservation of the C-parity within the standard model and for the search of dark U-bosons. This reaction has not been observed so far and only an upper limit of the branching ratio of 4×10^{-5} is quoted by the PDG. With the WASA-at-COSY facility a huge data set of $\approx 5 \times 10^8$ η mesons has been produced in proton-proton scattering dedicated for studies on rare and forbidden decays of the η meson. This high statistics measurement allows for the determination of the relative branching ratio below the recent upper limit and is sensitive to small C-violating and dark matter contributions. The current status of the analysis will be presented and discussed.

*Supported by FFE program of the Forschungszentrum Jülich.

HK 48.10 Wed 17:00 C/Foyer

Feasibility Study of a Transversely Polarized Target in PANDA — Heybat Ahmadi[1,2], Samer Ahmed[1], Luigi Capozza[1,3], Alaa Dbeyssi[1,3], Malte Deiseroth[1,2], •Bertold Fröhlich[1,3], Dmitry Khaneft[1,2], Dexu Lin[1,3], Frank Maas[1,3], María Carmen Mora Espí[1,3], Cristina Morales Morales[1,3], Oliver Noll[1,2], David Rodríguez Piñeiro[1,3], Roserio Valente[1,2], Manuel Zambrana[1,2], and Iris Zimmermann[1,3] — [1]Helmholtz-Institut Mainz — [2]Johannes Gutenberg-Universität Mainz — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH

The PANDA (Antiproton Annihilation at Darmstadt) spectrometer, located at the Facility for Antiproton and Ion Research (FAIR), is an excellent tool for exploring the nucleon structure. An unpolarized target allows the determination of the electromagnetic time-like form factor of the proton. An additional experiment in which the target is transversely polarized is necessary for the first-time extraction of their imaginary part.

A transverse polarization requires the shielding of the 2 T longitudinal field from the PANDA-Solenoid at the target volume and an additional transverse holding field.

We present results from our first experiment at the Institut für Kernphysik in Mainz on intense magnetic flux shielding using a BSCCO (bismuth strontium calcium copper oxide) thin-wall hollow cylinder at 4.2 K and a 1.4 T external magnetic field and compare this to numerical calculations.

HK 48.11 Wed 17:00 C/Foyer

The Search for a $\pi\Lambda N - \pi\Sigma N$ Resonance in pp@3.5 GeV* — •Jia-Chii Berger-Chen for the HADES-Collaboration — Physik Department E12 and Excellence Cluster "Universe", Technische Universität München, 85748 Garching, Germany

Inspired by recent relativistic three-body Fadeev calculations by Garcilazo and Gal [1] predicting a possible existence of a $\pi\Lambda N - \pi\Sigma N$ resonance, an experimental analysis was started to search for this state in p+p reactions at $E_{kin} = 3.5$ GeV recorded with the HADES experiment (GSI, Darmstadt, Germany). This hypothetical resonance can be denoted as a $\mathcal{Y}$ dibaryon with the quantum numbers $(Y, I, J^P) = (1, \frac{3}{2}, 2^+)$ and seen as a quasibound state of $\Sigma(1385)N - \Delta(1232)Y$ (N = nucleon, Y = hyperon) with a binding energy of about 50 MeV. The analysis exploits the unique decay of the double charged $\mathcal{Y}$ into a Σ^+ and a proton in the reaction $p + p \to \mathcal{Y}^{++} + K^0$ and the knowledge gained in the exclusive analysis of K^0 channels associated with resonances [2]. The contribution includes a description of the analysis as well as preliminary results.

[1]H. Garcilazo and A. Gal, Nucl. Phys. A 897:167-178 (2013).
[2]G. Agakishiev et al. (HADES), Phys. Rev. C 90:015202 (2014).

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HK 48.12 Wed 17:00 C/Foyer

Measurement of the Pion Polarizability with COMPASS — •Stefan Huber for the COMPASS collaboration — Technische Universiät München

Chiral Perturbation Theory predicts a precise value for the charged-pion polarisability. Experiments performed within the last decades are in tension with this value and also do not agree with each other. At the COMPASS experiment at CERN the pion polarisability is accessible through the Primakoff effect, where the quasi-real photons surrounding the nickel nuclei are used to measure pion-photon scattering. Studying the energy distribution of the outgoing photons, the polarisability value can be extracted. During the 2009 data taking COMPASS performed a first measurement based on about 60 000 exclusive events. In addition to the measurement with a pion beam a control measurement with a muon beam has been performed in order to control the systematics. The details of the measurement as well as the results will be discussed. Currently we are analysing a data set taken in 2012 which will allow us to study the value with better statistical and systematical precision.

HK 48.13 Wed 17:00 C/Foyer

Status of a High Gradient CH - Cavity — •Ali Almomani and Ulrich Ratzinger — IAP - Frankfurt Universität

This pulsed linac activity aims on compact designs and on a considerable increase of the voltage gain per meter. A high gradient CH - cavity

operated at 325 MHz was developed at IAP - Frankfurt. The mean effective accelerating field for this cavity is expected well above 10 MV/m at $\beta = 0.164$. This cavity is developed within a funded project. The results might influence the rebuilt of the UNILAC - Alvarez section, aiming to achieve the beam intensities specified for the GSI - FAIR project (15 mA U28+). Another motivation is the development of an efficient pulsed ion accelerator for significantly higher energies like 60 AMeV. The new GSI 3 MW Thales klystron test stand will be used for the cavity RF power tests. Detailed studies on two different types of copper plating will be performed with this cavity. Additionally, operating of normal conducting cavities at cryogenic temperatures will be discussed for the case of very short RF pulses. The first measurement results for this cavity will be presented.

HK 48.14 Wed 17:00 C/Foyer

Entwicklung eines neuartigen Injektionssystems für einen toroidalen Hochstromspeicherring — •Heiko Niebuhr, Adem Ates, Martin Droba, Oliver Meusel, Ulrich Ratzinger und Joschka Wagner — Institut für Angewandte Physik, Goethe-Universität, Max-von-Laue Str. 1, 60438 Frankfurt

Zur Realisierung des angedachten supraleitenden magnetostatischen Speicherrings (F8SR) zur Speicherung hoher Ionenströme wird zurzeit an der Universität Frankfurt ein herunterskaliertes Strahlexperiment mit zwei normalleitenden Toroidsegmenten durchgeführt. Nachdem die Strahldynamik beim Strahltransport eines Ionenstrahls durch einen solchen toroidalen Kanal erforscht wurde, wird im nächsten Schritt die seitliche Injektion mittels einer Injektionsspule bei gleichzeitiger Beobachtung des Ringstrahls erforscht. Zur Umsetzung des angedachten Experiments werden neben theoretischen und experimentellen Befunden auch Simulationen des Experiments mit dem am IAP in Entwicklung befindliche 3D Simulationsprogramm "bender" genutzt. Bei dem Experiment handelt es sich im Vergleich zum angedachten magnetostatischen Speicherring um ein herunterskaliertes Experiment bei Raumtemperatur mit zwei Toroidsegmente mit einem Magnetfeld von 0,6 T. Die niederenergetischen Ionenstrahlen werden durch zwei Volumenionenquellen bereitgestellt. Mit Hilfe zweier Filterkanäle werden die Strahlen gefiltert um zwei Protonenstrahlen zu erhalten. Der eine Strahl wird in das erste Toroidsegment und der andere mittels einer Injektionsspule zwischen die beiden Toroidsegmente injiziert. Zur Untersuchung stehen verschiedene Strahldiagnosesysteme zur Verfügung.

HK 48.15 Wed 17:00 C/Foyer

Development of a 325 MHz Ladder-RFQ of the 4-Rod-Type — •Maximilian Schütt[1], Ulrich Ratzinger[1], and Robert Brodhage[2] — [1]Institut für Angewandte Physik, Goethe-Universität, Frankfurt a. M. — [2]GSI, Darmstadt

For the research program with cooled antiprotons at FAIR a dedicated 70 MeV, 70 mA proton injector is required. In the low energy section, between the Ion Source and the main linac an RFQ will be used. The 325 MHz RFQ will accelerate protons from 95 keV to 3.0 MeV. This particular high frequency for an RFQ creates difficulties, which are challenging in developing this cavity. In order to define a satisfactory geometrical configuration for this resonator, both from the RF and the mechanical point of view, different designs have been examined and compared. Very promising results have been reached with a ladder type RFQ, which has been investigated since 2013. We present recent 3D simulations of the general layout and of a complete cavity demonstrating the power of a ladder type RFQ as well as measurements of a 0,8 m prototype RFQ, which was manufactured in late 2014 and designed for RF power and vacuum tests. We will outline a possible RF layout for the RFQ within the new FAIR proton injector and highlight the mechanical advantages.

HK 48.16 Wed 17:00 C/Foyer

Beam Dynamics for the sc cw Heavy Ion Linac at GSI — •Malte Schwarz[1], Michael Amberg[1,2], Kurt Aulenbacher[2], Winfried Barth[3], Markus Basten[1], Florian Dziuba[1], Viktor Gettmann[3], Sascha Mickat[3], Holger Podlech[1], and Stepan Yaramyshev[3] — [1]Institut für Angewandte Physik, Goethe-Universität Frankfurt am Main — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt — [3]Helmholtz Institut Mainz (HIM)

For future experiments with heavy ions at the coulomb barrier within the SHE research project a multi-stage R&D program of GSI, HIM and IAP is currently under progress. It aims at developing a superconducting (sc) continuous wave (cw) LINAC with multiple CH-cavities as key components. The beam dynamics concept is based on EQUUS (Equidistant Multigap Structure) constant-beta cavities. The advantages of its periodicity are a high simulation accuracy, easy manufacturing and tuning with minimized costs as well as a straightforward energy variation. An important milestone will be the full performance test of the first LINAC section (demonstrator) with beam. The corresponding beam dynamics simulations will be presented.

HK 48.17 Wed 17:00 C/Foyer

Entwurf einer Targetkammer zum Einsatz in (p,γ)-Experimenten an FRANZ* — •Ceyhun Arda, Kerstin Sonnabend, René Reifarth, Benedikt Thomas, Markus Reich, Anne Endres, Jan Glorius und Stefan Schmidt — Goethe Universität Frankfurt

An der Frankfurter Neutronenquelle am Stern-Gerlach-Zentrum (FRANZ) werden Experimente mit hochintensiven Protonenstrahlen geplant. Für die geplanten kalorimetrischen Messungen der Wirkungsquerschnitte ^{90}Zr(p,γ) und ^{91}Nb(p,γ) ist die Entwicklung einer Targetkammer unabdingbar. Durch 3D-Modellierungen einer Targetkammer und des 4π BaF_2-Kalorimeters konnte das geringe Platzangebot innerhalb des Detektors optimal in den Entwicklungsprozess eingebunden werden. Bei dem Entwurf der Targetkammer wurden Bauteile wie Gegenspannungsblende, Lochblende und Kühlfalle berücksichtigt und in die Targetkammer integriert. Zudem wurden Temperatursimulationen bezüglich der Kühlfalle durchgeführt. Der bisherige Entwurf und weitere Pläne werden vorgestellt.

*gefördert durch die DFG(SO907/2-1), Nautilus und HIC for FAIR.

HK 48.18 Wed 17:00 C/Foyer

Konstruktion und Erprobung einer Probenhalterung mit integrierter Wasserkühlung und Temperaturüberwachung für hochleistungsbeständige Proben an FRANZ* — •Markus Reich, Kerstin Sonnabend, René Reifarth, Ceyhun Arda, Anne Endres, Philipp Erbacher, Benedikt Thomas und Stefan Schmidt — Goethe Universität Frankfurt

Experimente mit hochintensiven Protonenstrahlen an der Neutronenquelle FRANZ stellen besondere Anforderungen an bestrahlte Proben. Da in der ersten Aufbauphase ein Protonenstrahl mit 2 MeV Energie und etwa 2 mA Intensität zur Verfügung steht wird eine Leistungsdeposition von 4 kW in den Proben erwartet. Um zu hohen Temperaturen und damit einer Beschädigung der Proben entgegen zu wirken, muss diese Leistung effektiv von der Probe abgeführt werden. Eine bereits in Temperatursimulationen untersuchte, effiziente Wasserkühlung wird realisiert und getestet. Zur Überwachung der Temperaturentwicklung auf der Probenoberfläche wird zusätzlich eine in die Probenkammer integrierte Temperaturüberwachung mittels IR-Sensoren entwickelt und unter Strahlbedingungen getestet. Der aktuelle Stand der Entwicklungsarbeiten wird vorgestellt und folgende Schritte diskutiert.

* gefördert durch DFG(SO907/2-1) und HIC for FAIR.

HK 48.19 Wed 17:00 C/Foyer

Construction and Test of a New Time-of-Flight Wall Prototype for R^{3}B — Max Gilbert[1], •Michael Heil[2], René Reifarth[1], Jan Glorius[1], and Tanja Heftrich[1] for the R3B-Collaboration — [1]Goethe Universität Frankfurt, Frankfurt, Germany — [2]GSI Helmholtzzentrum, Darmstadt, Germany

In order to fully exploit the potential of FAIR beams at the R^{3}B setup a new time-of-flight wall with superior time and energy resolution is essential. With the time-of-flight and energy loss measurements of the ToF wall the mass and the nuclear charge of the reaction products can be uniquely determined. The excellent performance has to be maintained even for heavy ion beams up to the Pb region and at high counting rates up to 1 MHz. The planned detector will consist of 176 plastic scintillator paddles in 4 layers. A smaller prototype with 24 paddles was tested at GSI with ^{58}Ni and ^{48}Ca beams. The design of the detector as well as the results of the performance tests will be presented.

HK 48.20 Wed 17:00 C/Foyer

Bestimmung des ^{10}Be(n,γ) Wirkungsquerschnitts mit $LaBr_3$ Detektoren — •Meiko Volknandt[1], Enno Hrivula[1], Klaus Eberhardt[2], Anne Endres[1], Matthias Fix[1], Tanja Heftrich[1], Stefan Heinitz[3], Arnd Junghans[4], Franz Käppeler[5], Alberto Mengoni[6], Rene Reifarth[1], Stefan Schmidt[1], Dorothea Schumann[3], Mario Weigand[1] und Norbert Wiehl[2] — [1]Goethe Universität Frankfurt, Frankfurt, Germany — [2]Johannes Gutenberg-Universität Mainz, Mainz, Germany — [3]Paul Scherrer Institut, Villigen, Switzerland — [4]Helmholtzzentrum Dresden-Rossendorf, Dresden,

Germany — [5]Karlsruhe Institute of Technology, Karlsruhe, Germany — [6]CERN, Geneva, Switzerland

Für das Verständnis der Nukleosynthese des Urknalls und zur Verifikation der Abschätzung der Umkehrreaktion, dem Coulombaufbruch von ^{11}Be ist die Analyse der ^{10}Be(n,γ) Reaktion unerlässlich. Über eine Aktivierung im Neutronenspektrum am TRIGA-Forschungsreaktor in Mainz wurde der ^{10}Be(n,γ) Wirkungsquerschnitt für thermische und epithermische Neutronen bestimmt. Die Trennung der beiden Anteile im Spektrum wurde mit der Cadmiumdifferenzmethode durchgeführt. Die Aktivität des frisch erzeugten, kurzlebigen ($t_{1/2}$ = 13.81 s) ^{11}Be wurde mit Hilfe von $LaBr_3$ Szintillationsdetektoren gemessen. Anhand der sehr hochenergetischen Gammalinie bei 6.791 MeV konnte ^{11}Be untergrundfrei direkt beobachtet und quantitativ ausgewertet werden. Es handelt sich dabei um die erstmalige Bestimmung des ^{10}Be(n,γ) Querschnittes.

HK 48.21 Wed 17:00 C/Foyer

Bound-state β-decay of bare ^{205}Tl^{81+} — •Bingshui Gao for the FRS-ESR-Collaboration — GSI, Helmholtzzentrum für Schwerionenforschung, Planckstr. 1, D-64291 Darmstadt, Germany

Beta decay into bound electron states of the daughter atom (β_b^-), accompanied by the emission of a monochromatic antineutrino, has been predicted by Daudel et al. However, a noteworthy probability of β_b^--decay exists only for highly-charged ions and the experimental storage ring ESR at GSI is a unique tool for investigating β_b^--decays. A forthcoming experiment is the determination of the half-life of β_b^--decay of bare ^{205}Tl^{81+}, which is related to both the solar pp-neutrino flux and the s-process nucleosynthesis. On the one hand, the LOREX project addresses the relative amount of ^{205}Tl and ^{205}Pb atoms in deep-lying thallium-rich minerals. There ^{205}Pb atoms are generated by the capture of solar pp-neutrinos, with an unprecedented small threshold of only 52 keV. The ratio of ^{205}Pb/^{205}Tl renders the product of the mean pp-solar neutrino flux $<\phi_{\nu_e}>$ and the neutrino capture cross section σ_{ν_e}. The latter can only be obtained by measuring the half-life of β_b^--decay of bare ^{205}Tl^{81+} because ν_e-capture andβ_b^--decay share the same nuclear matrix element. On the other hand, ^{205}Pb is the only purely s-process short-lived radioactivity which gives insight in nucleosynthesis just prior to Sun's birth. It has been demonstrated that in the stellar environment the production rate of ^{205}Pb in the s-process sensitively depends on both free electron capture of ^{205}Pb and β_b^--decay of bare and H-like ^{205}Tl. It is thus desirable to measure the half-life of the β_b^--decay of ^{205}Tl^{81+}.

HK 48.22 Wed 17:00 C/Foyer

Elliptic flow of inclusive electrons in Pb-Pb collisions — •Sebastian Scheid, Raphaelle Bailhache, Theodor Rascanu, and Harald Appelshäuser for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The main purpose of ALICE at the LHC is to investigate the properties of the deconfined state of strongly-interacting matter produced in high-energy heavy-ion collisions. Since heavy quarks, i.e. charm and beauty, are produced on a shorter time scale with respect to the hot fireball, they are suited to probe the interaction dynamics inside the medium.

Heavy-flavour hadrons can be measured via their semi-electronic decays at mid-rapidity with ALICE. The heavy-flavour elliptic flow, the second harmonic in the Fourier expansion of the particle azimuthal distribution, is an observable sensitive to the degree of thermalization of charm and beauty quarks in the medium at low p_{T}, as well as to the path length dependence of the energy loss of heavy quarks at high p_{T}.

In this poster, I will show how the elliptic flow of inclusive electrons is measured with the event-plane method in 20-40% central Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV. Electrons are identified with the Time-Projection-Chamber and the Time-Of-Flight in the central barrel in the p_{T} range 1.5-6 GeV/c. The estimation of the remaining hadron contamination will be presented as well as a possible way to subtract this contribution to the elliptic flow.

Supported by BMBF and the Helmholtz Association.

HK 48.23 Wed 17:00 C/Foyer

Investigation of resonance lifetimes and mean free paths in a transport approach — •Marcel Lauf[1,2], Thomas Kehrenberg[1,2], Dmytro Oliinychenko[1,3], Janus Weil[1], Matthias Kretz[1], and Hannah Petersen[1,2] — [1]Frankfurt Institute for Advanced Studies, Frankfurt, Germany — [2]Goethe University, Frankfurt, Germany — [3]Bogolyubov Institute for Theoretical Physics, Kiev, Ukraine

Hadronic transport approaches are used to describe the dynamical evolution of heavy-ion reactions at low beam energies (up to FAIR/RHIC/SPS energies). In this work, we investigate specific properties of a time step based simulation of heavy-ion collisions in a microscopic transport model (SMASH). First, the actual lifetimes of resonances in the simulation are compared to theoretical expectations. Furthermore, the dependence of scattering rates on the choice of the time step size is analyzed. The time steps need to be smaller than the mean free path of the particles, which is calculated via the local density and individual scattering cross section. Based on these findings an algorithm to determine the optimal time step size is developed.

HK 48.24 Wed 17:00 C/Foyer

Charged particle production under EMCal trigger condition with ALICE — •Patrick Huhn — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment at the LHC is designed to study the properties of the Quark-Gluon-Plasma (QGP). The measured transverse momentum (p_{T}) distribution in heavy ion collisions can be compared to that measured in pp collisions in terms of the nuclear modification factor (R_{AA}). The minimum bias pp reference at $\sqrt{s}$ = 2.76 TeV and therefore R_{AA} in Pb-Pb collisions are currently limited in their p_{T} range to p_{T} = 50 GeV/c. To extend the p_{T} distribution to higher p_{T} (p_{T} > 50 GeV/c), triggers can be used.
We present an analysis of the cross section of inclusive charged particles in pp collisions as a function of p_{T} with a selection on deposited energy in the electromagnetic calorimeter (EMCal). Results based on a Toy Monte Carlo simulation including realistic EMCal geometry and acceptance to evaluate trigger biases are presented.
Supported by BMBF and the Helmholtz Association.

HK 48.25 Wed 17:00 C/Foyer

Measurement of Neutral Pions with the ALICE PHOS in pp-collisions at $\sqrt{s}$ = 8 TeV — •Svenja Pflitsch — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE-experiment at the LHC is dedicated to study the properties of the Quark-Gluon-Plasma by means of heavy-ion-collisions. Hadronic spectra in pp-collisions at the same energy establish a vital baseline for the understanding of hadron-production. In this context the measurement of neutral pions via the two-photon decay channel provides a complementary analysis to the measurement of charged pions.

The PHOS is one of the two electromagnetic calorimeters of ALICE, consisting of $PbWO_4$ crystals. The reconstruction method of the decay-photons and the large signal-to-background ratio in pp collisions lead to a high statistics measurement across a large p_T range.

We present the status of the analysis of neutral pions based on LHC Run 1 data at $\sqrt{s}$ = 8 TeV. Details of the analysis such as peak extraction and the resulting spectra are discussed. This includes acceptance and reconstruction efficiencies derived from Monte-Carlo simulations as well as a comparison with an independent parallel analysis.

Supported by BMBF and the Helmholtz Association.

HK 48.26 Wed 17:00 C/Foyer

Measurement of the eta meson with the ALICE PHOS. — •Fabian Pliquett for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

ALICE as the dedicated heavy ion experiment at the LHC is designed to investigate the properties of the quark gluon plasma. The measurement of the eta meson production complements other measurements of identified particles in the experiment. Collisions of protons with nuclei function as a control experiment to study initial state effects in heavy ion collisions.

The PHOS, one of the electromagnetic calorimeters of the experiment, measures the energy and position of photons with high resolution and therefore allows for the reconstruction of the eta meson by its two-photon decay channel.

The status of the analysis of the eta meson in p-Pb collisions at $\sqrt{s}$ = 5.02 TeV with the ALICE PHOS including peak extraction and acceptance and reconstruction efficiency corrections will be presented.

Supported by BMBF and the Helmholtz Association.

HK 48.27 Wed 17:00 C/Foyer

Study of intermediate mass e+e- pairs from correlated

semileptonic decays of heavy-flavour hadrons — •Marvin Kohls, Raphaelle Bailhache, and Harald Appelshäuser for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt am Main

The main purpose of ALICE at the LHC is to investigate the properties of the deconfined state of strongly interacting matter produced in high-energy heavy-ion collisions. Since leptons do not interact strongly with the medium, dielectrons carry information from all collision stages with negligible final state interactions. In particular in the intermediate invariant mass region the measurements of thermal dielectron emission would allow to estimate the temperature of the medium created. The main background is coming from electron-positron pair from correlated semi-leptonic charm and anti-charm quark decays.

In this poster, we will present feasibility studies to suppress and/or measure the ccbar correlation contribution in the dielectron spectrum in Pb-Pb collisions. We make use of the large life time of the D mesons and therefore the large distance of closest approach (DCA) to the primary vertex of the charm decay electrons. We will show first results based on Monte Carlo studies with a complete simulation of the ALICE detector.

HK 48.28 Wed 17:00 C/Foyer

Estimating Hadron Contamination of Electron Samples in Pb–Pb Collisions at Low Momenta Using ALICE — •Martin Brass for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg, Germany

A Large Ion Collider Experiment at the LHC is exploring a new state of matter at high energy densities in Pb–Pb collisions. Electrons from heavy-flavor decays are interesting probes of the properties of this state, since charm and beauty quarks - produced in initial hard scatterings - experience the whole evolution of the state. Due to high multiplicities in Pb–Pb collisions and to the limited separation power of the ALICE Time-Of-Flight (TOF) detector between electrons and pions at momenta above 1 GeV/c, there is a large hadronic background in the observed electron samples. Furthermore a significant amount of protons, kaons and deuterons are misidentified by TOF and contaminate the electron sample, too. Many Heavy-Flavor-Electron analyses rely on a precise estimation of the contamination. The presented analysis uses measured energy loss distributions of the ALICE Time Projection Chamber as templates for a least squares fit routine to estimate the amount of hadronic background in the electron sample at momenta above 0.4 GeV/c. To describe the energy loss distributions of the misidentified particles, the measured distributions of particles which are identified by TOF are used. The energy loss distribution for pions is obtained using the ALICE Transition Radiation Detector which provides good separation between pions and electrons.

HK 48.29 Wed 17:00 C/Foyer

Vergleich von Photoabsorptionsquerschnitten relativistischer Protonenstreuung mit elektromagntischen Proben* — •Sergej Bassauer[1], Jonny Birkhan[1], Carlos Bertulani[2] und Peter von Neumann-Cosel[1] für die EPPS0-Kollaboration — [1]Institut für Kernphysik, TU Darmstadt, Darmstadt, Germany — [2]Department of Physics and Astronomy, Texas A&M University-Commerce, Commerce, USA

Durch den Vergleich aus der Coulombanregung extrahierter Photoabsorptionsquerschnitte in relativistischer Protonenstreuung mit elektromagnetischen Proben können Rückschlüsse auf den aus nuklearen Prozessen resultierten Untergrund gezogen werden [1,2]. Hierfür stehen Protonenstreudaten für die Kerne ^{28}Si, ^{40}Ca, ^{48}Ca, ^{96}Mo, ^{120}Sn, ^{144}Sm, ^{154}Sm und ^{208}Pb sowie die entsprechenden Photoabsorptionsquerschnitte zur Verfügung. Die Photoabsorptionsquerschnitte werden mit Hilfe der semiklassischen virtuellen Photonenmethode und mit Hilfe der eikonalen Näherung extrahiert [3,4]. Hierbei werden die Ergebnisse der beiden Methoden verglichen und die Vor- bzw. Nachteile diskutiert.

*Gefördert durch die DFG im Rahmen des SFB 634 und NE 679/3-1.
[1] A. Tamii et al., Phys. Rev. Lett. **107** (2011) 062502.
[2] I. Poltoratska et al., Phys. Rev. C **85** (2012) 041304.
[3] C. Bertulani und G. Baur, Phys. Rep. **163** (1987) 299.
[4] C. Bertulani und A. Nathan, Nucl. Phys. A **554** (1993) 158.

HK 48.30 Wed 17:00 C/Foyer

Study of quadrupole collectivity in odd mass Po and Bi isotopes * — •H. Pai[1], M. L. Cortés[1,2], M. Reese[1], J. Gerl[2], M. Górska[2], N. Pietralla[1], Zs. Podolyák[3], and D. Rudolph[4] for the S429 PreSPEC-AGATA-Collaboration — [1]Institut für Kernphysik, Technische Universität Darmstadt, D-64289 Darmstadt, Germany — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH, D-64291 Darmstadt, Germany — [3]Department of Physics, University of Surrey, Guildford, GU2 7XH, United Kingdom — [4]Department of Physics, Lund University, SE-22100 Lund, Sweden

Relativistic Coulomb excitations of odd-mass Po and Bi isotopes [1] were performed during the PreSPEC-AGATA campaign [2] at GSI to study the quadrupole collectivity in the direct vicinity of the heaviest stable doubly-magic nucleus ^{208}Pb. The PreSPEC-AGATA campaign is the predecessor of the HISPEC (High-resolution In-flight Spectroscopy) experiment in the FAIR context. It was running 2012 and 2014 at GSI. Up to 23 AGATA crystals were used in this campaign, located behind the FRagment Separator. We will present the status of the ongoing data analysis and discuss the challenges of data analysis for this type of experiments.

[1] D. Rudolph, Zs. Podolyák *et al.,* GSI-Proposal **S429** (2011).
[2] N. Pietralla *et al.,* EPJ Web of Conferences **66**, 02083 (2014).
*Supported by the Helmholtz International Center for FAIR, European Nuclear Science and Applications Research (ENSAR) and by the German Federal Ministry of Education and Research (BMBF).

HK 48.31 Wed 17:00 C/Foyer

Wavelet analysis ^{120}Sn(p,p') reaction data — •Andreas Ebert[1], Anna Maria Krumbholz[1], Peter von Neumann-Cosel[1], and Atsushi Tamii[2] for the EPPS0-Collaboration — [1]Institut für Kernphysik, TU Darmstadt — [2]Research Center for Nuclear Physics, Osaka University, Japan

In the recent years wavelet analysis has been established as a tool in nuclear structure physics. For an analysis of the fine structure in the energy region of the Giant Dipole Resonance the wavelet analysis allows the extraction of scales [1] and level densities [2] from scattering data. In a high-resolution experiment the ^{120}Sn(p,p') reaction was investigated with a 295 MeV beam scattered under zero degrees at the Research Center for Nuclear Physics (RCNP) in Osaka/Japan [3,4]. The extracted scales and level densities will be compared with various theoretical predictions.

[1] A. Shevchenko et al., Phys. Rev. C 77, 024302 (2008)
[2] P G. Hansen, Annu. Rev. Nucl. Part. Sci. 29, 69 (1979)
[3] A. Tamii et al., Phys. Rev. Lett. 107, 062502 (2011)
[4] A. M. Krumbholz, Doctoral thesis D 17, TU Darmstadt, (2014)

*supported by the DFG through the projects SFB 634 and NE 679/3-1.

HK 48.32 Wed 17:00 C/Foyer

Compton-Polarimetrie von Gammaquanten aus der Reaktion ^{143}Nd$(n,\gamma)^{144}$Nd mit EXOGAM@ILL. — •Mehmet Tezgel und Michael Thürauf für die EXILL-Kollaboration — Institut für Kernphysik, TU Darmstadt

In ^{144}Nd wird ein isovektorieller Oktupolzustand bei 2779 keV vermutet, welcher durch einen starken $M1$-Übergang in sein symmetrisches Pendant zerfällt. Diese Klasse von Zuständen wurde im Rahmen des Interacting-Boson-Modells (IBM-2) vorhergesagt. Als Teil der EXILL-Kampagne im Jahr 2012/13 wurde daher ein Neutroneneinfangexperiment an ^{143}Nd durchgeführt. Der Kern ^{144}Nd wird über die Reaktion ^{143}Nd$(n,\gamma)^{144}$Nd erzeugt und befindet sich in einem angeregten Zustand, der über mehrere Kaskaden in den Grundzustand zerfällt.

Es wurde die Linearpolarisation der Übergangsstrahlung in ^{144}Nd analysiert, um deren Strahlungscharakter zu bestimmen. Im Poster wird der EXILL-Aufbau und die Methode der Compton-Polarimetrie anhand der verwendeten Clover-Detektoren erklärt.

Exemplarische Ergebnisse werden anhand von einigen Kaskaden in ^{144}Nd vorgestellt.

Gefördert durch die DFG (KR 1796/2-1).

HK 48.33 Wed 17:00 C/Foyer

Measurement of picosecond lifetimes in odd neutron-rich Xe isotopes — Michael Habib, •Stoyanka Ilieva, and Thorsten Kröll for the EXILL-FATIMA-Collaboration — Institut für Kernphysik, TU Darmstadt

The nuclear properties in the region around the doubly magic nucleus ^{132}Sn are of special interest. Theory relies on nuclei near closed shells for predicting other, more complex systems. Our interest lies in particular on the neutron-rich Xe isotopes ($^{138-144}$Xe), as they exhibit both quadrupole and octupole collective properties. The lifetime of an

excited state is a direct measure for the strength of the transition and thus allows us to study both phenomena.

Within the EXILL&FATIMA campaign at the experimental nuclear reactor at ILL, Grenoble, the lifetimes of the excited states, populated in the neutron-induced fission of ^{235}U and ^{241}Pu targets, were measured. Using the generalized centroid difference method to analyse the data from the fast timing array (FATIMA) allows us to determine lifetimes down to $\approx$ 10 ps [1]. The high-resolution EXILL (EXOGAM@ILL) detector gives us the possibility to identify the nuclides of interest among the big amout of produced fission fragments. In this contribution we present the first measurement of lifetimes of low-lying excited states in the odd isotopes ^{139}Xe and ^{141}Xe.

[1] *J.-M. Régis et al., Nucl. Instr. Meth. Phys. Res. A 763 (2014) 210*

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HK 48.34 Wed 17:00 C/Foyer

New Mass Analysis and Results for Neutron Rich Nuclei performed with Isochronous Mass Spectrometry — •Marcel Diwisch[1], Ronja Knöbel[1,2], Zygmunt Patyk[3], Hans Geissel[1,2], Wolfgang Plass[1,2], Christoph Scheidenberger[1,2], and Helmut Weick[2] — [1]Justus-Liebig-Universität Gießen, Gießen, Germany — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — [3]Soltan Institute for Nuclear Studies, Warsaw, Poland

The Isochronous Mass Spectrometry (IMS) allows to measure masses of rare exotic nuclei in a storage ring in a timescale of tens of μs. The ring is operated in an isochronous mode, i.e. such that particles with different velocities but same mass-to-charge ratio (m/q) travel different paths in the ring arcs (faster ions travel longer paths whereas slower ions travel shorter paths). This means that for each m/q a fix revolution time exists and can be measured by a time-of-flight (TOF) detector which then yields the masses of the nuclei for known charge states. A new analysis approach of IMS data with a correlation matrix method allowed combining data with different quality. The latest production run was using an additional determination of the magnetic rigidity which increased the resolving power of the experiment. Combining this experiment with previous experiments one can increase the statistics and accuracy of the overall mass determination. It was possible to deduce mass values of neutron rich isotopes which have not been measured before. One of those isotopes is ^{130}Cd which is a very important nuclei involved in the r-process. Those mass values and a comparison to theoretical predictions will be presented in the poster.

HK 48.35 Wed 17:00 C/Foyer

Messung der Fragmenteigenschaften von ^{232}Th in Niederenergie Photonen-induzierter Spaltung am S-DALINAC — •Martin Freudenberger[1], Joachim Enders[1], Martin Espig[1], Alf Göök[2], Andreas Oberstedt[3], Stephan Oberstedt[2] und Markus Wagner[1] — [1]Institut für Kernphysik, TU Darmstadt — [2]European Commission, DG Joint Research Center (IRMM), Geel, Belgien — [3]Fundamental fysik, Chalmers tekniska högskola, Göteborg, Schweden

Die korrelierte Winkelverteilung sowie die totale kinetische Energie der Spaltfragmente aus der Photonen-induzierten Spaltung von ^{232}Th wurden im Bereich 6.0 MeV - 8.0 MeV am Darmstädter supraleitenden Elektronenlinearbeschleuniger S-DALINAC mit Hilfe von Bremsstrahlungsphotonen bestimmt. Besondere Aufmerksamkeit wurde dabei auf die Bestimmung des Anisotropieparameters B/A und dem Verhältnis der Quadrupolkomponente zur Dipolkomponente C/B bei Energien nahe der Spaltbarriere gelegt.

Diese Arbeit wurde in Teilen unterstützt durch den SFB 634 der DFG.

HK 48.36 Wed 17:00 C/Foyer

Search for two-proton radioactivity of ^{30}Ar by tracking its decay products — •Xiaodong Xu — GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt — Justus-Liebig-Universität Giessen, Giessen

Two-proton (2p) radioactivity is an exotic decay mode resulting in a simultaneous emission of two protons. It was predicted for a number of neutron deficient nuclei beyond the proton drip line [1]. The ground-state (g.s.) 2p radioactivity was discovered in 2002 [2,3].

In 2012, an in-flight decay experiment aimed to investigate the 2p radioactivity of previously unknown nucleus ^{30}Ar was performed with the fragment separator FRS of GSI. By tracking the decay products with silicon micro-strip detectors, 2p decays of ^{30}Ar in-flight have been observed for the first time. The decay vertices were reconstructed through the measured ^{28}S + p + p trajectories. In order to obtain the 2p decay energy and half-life, the angular correlations of fragments were analyzed. New data on the known 2p precursor ^{19}Mg has been also obtained. The decay energy of g.s. of ^{19}Mg has been deduced and it is consistent with the previously reported data [4].

[1] V. Goldansky, *Nucl. Phys.* **19**, 482 (1960)
[2] M. Pfützner, et al., *Eur. Phys. J. A* **14**, 279 (2002)
[3] J. Giovinazzo, et al., *Phys. Rev. Lett.* **89**, 102501 (2002)
[4] I. Mukha, et al., *Phys. Rev. C* **85**, 044325 (2012)

HK 48.37 Wed 17:00 C/Foyer

Influence of the measured work function fluctuation on the aSPECT spectrometer — •Christian Schmidt for the aSPECT-Collaboration — Institut für Physik, Johannes-Gutenberg Universität Mainz

The aSPECT retardation spectrometer measures the e-$\bar{\nu}_e$ angular correlation coefficient a in free neutron β decay by utilizing a MAC-E filter. This measurement can be used to determine the ratio $\frac{g_A}{g_V}$ of the weak coupling constants, as well as to search for physics beyond the Standard Model.

In spring/summer 2013 aSPECT had a successful beamtime at the Institut Laue-Langevin, Grenoble (France). The goal of this beamtime is to improve the current uncertainty of a from $\frac{\Delta a}{a} \approx 5$ % to about 1%. To achieve this goal the systematics of aSPECT have to be understood accordingly.

One sensitive parameter for the systematic error on a is the knowledge of the retardation voltage, which is defined by our decay volume and analysing plane electrode. Since the potentials are directly influenced by the work function of these electrodes, we utilised a scanning Kelvin probe to measure the work function fluctuations. To investigate the influence on a the measured fluctuations were implemented in a simulation program , the KASPER package, provided by the KATRIN collaboration.

This poster will present the first results of the influence of work function fluctuations on the aSPECT spectrometer using particle tracking.

HK 48.38 Wed 17:00 C/Foyer

Towards a new measurement of parity violation in ytterbium — •Dionysios Antypas[1], Nathan Leefer[1], Kostantin Tsigutkin[2], and Dmitry Budker[1,3] — [1]Helmholtz Institut-Mainz, Mainz, Germany — [2]ASML, Veldhoven, The Netherlands — [3]Johannes Gutenberg Universitaet-Mainz, Mainz, Germany

The ytterbium (Yb) atomic parity violation (APV) experiment has succeeded in measuring the largest APV effect yet observed in any atom. Because of its size, and the availability of a chain of seven stable isotopes (including two with non-zero nuclear spin), studying APV in Yb is promising for measurements of the neutron distributions of the nucleus as well as for probing the nuclear anapole moment. The experiment recently moved from UC Berkeley to Mainz, and a new apparatus is currently under construction. We present the current state of the project, with emphasis on the next generation apparatus features that will allow us to perform sensitive measurements of the anapole moment and neutron skin contribution to the APV effect.

HK 48.39 Wed 17:00 C/Foyer

Exploring Antihyperons Potentials in Nuclei by Antiproton-Nucleon Reactions — •Alicia Sanchez Lorente for the PANDA-Collaboration — Helmholtz Institut Mainz

The exclusive production of hyperon-Antihyperon pairs close to their production threshold in antiproton-nucleus collisions offers a unique and hitherto unexplored opportunity to study the behaviour of Antihyperons in nuclei. For the first time we analyse these reactions in a microscopic transport model using the Giessen Boltzmann-Uehling-Uhlenbeck Transportmodel (GiBUU). We find a substantial sensitivity of transverse momentum correlations of coincident AntiLambda-Lambda-pairs to the assumed depth of the AntiLambda potential. Rather than diminishing this effect, secondary scattering effects which are more pronounced at deeper AntiLambda potentials enhance this sensitivity. Because of the high cross section for this process and the simplicity of this method our results pave the way for experimental studies at the FAIR facility.

HK 48.40 Wed 17:00 C/Foyer

ARGUS - The scintillating fibre tagging detector of the BGO-OD experiment — •Stefan Alef and Björn-Eric Reitz for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, 53115

Bonn

The BGO-OD experiment at the ELSA accelerator in Bonn is built to investigate baryon-resonances using meson-photoproduction off the nucleon. The photons are produced from the electron beam via bremsstrahlung. Linearly polarized photons are obtained by coherent scattering off a crystal. The degree of polarization is obtained from the measured energy spectrum of the electrons. At the moment the energy resolution is limited by the current tagging system. Therefore an additional tagging detector consisting of scintillating fibres was constructed.
A short overview of the detector and its properties along with some preliminary first results will be shown.
Supported by DFG (SFB/TR-16).

HK 48.41 Wed 17:00 C/Foyer

A recoil detector of Koala experiment at HESR — •Huagen Xu — Forschungszentrum Jülich

The concept of the luminosity detector for the PANDA experiment is based on measuring antiproton-proton elastic scattering in the Coulomb-nuclear interference region by 4 planes of HV-MAPS tracking detectors. The absolute precision is limited by the lack of existing data of the physics quantities σ_{tot}, ρ and b describing the differential cross section as a function of squared 4-momentum transfer t in the relevant beam momentum region. Therefore, the so-called Koala experiment has been proposed to measure antiproton-proton elastic scattering. The goal of Koala experiment is to measure a wide range of t-distribution to determine the parameters σ_{tot}, ρ and b. The idea is to measure the scattered beam antiprotons at forward angles by tracking detectors and the recoil target protons near 90° by energy detectors. In order to validate this method a recoil detector has been designed and built. Commissioning of the recoil detector by measuring proton-proton elastic scattering has been performed at COSY. Preliminary results of the commissioning will be presented.

HK 48.42 Wed 17:00 C/Foyer

Kalibrierung und Datenauslese eines Neutronendetektor-Arrays für (e,e'n) Experimente * — •Maxim Singer und Peter von Neumann-Cosel — Institut für Kernphysik, TU Darmstadt

Am supraleitenden Elektronenbeschleuniger S-DALINAC wurde ein Neutronendetektorball aufgebaut[1], welcher zur systematischen Untersuchung von Riesenresonanzen in koinzidenten Elektronen- und Photonenstreuexperimenten eingesetzt werden soll. Der Detektorball setzt sich aus 13 Flüssigszintillatordetektoren des Typs 5"× 2" BC-501A zusammen und deckt einen Raumwinkel von ungefähr 1.3 π ab. Präsentiert werden die Ergebnisse der Nachweiswahrscheinlichkeitsmessung für Neutronen für einzelne Detektoren und die Effizienz des Detektorballs für Mehrneutronenereignisse. Erste Konzepte zum digitalen Datenaufnahmesystem auf der Basis von Flash-ADCs in koinzidenter Schaltung mit dem QCLAM-Spektrometer werden diskutiert.
[1] M. Chernykh, Dissertation, D17, Technische Universität Darmstadt, (2008).
* Gefördert durch die DFG im Rahmen des SFB 634.

HK 48.43 Wed 17:00 C/Foyer

A teststation for submodules of the forward endcap of the PANDA electromagnetic calorimeter — •Merlin Rossbach, Matthias Kube, Ulrike Thoma, Christoph Schmidt, and Christoph Wendel for the PANDA-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, Germany

The forward endcap of the electromagnetic calorimeter of the PANDA experiment is currently being constructed. Its crystals are grouped into submodules consisting of 16 or 8 crystals each. Before these modules are mounted in the detector careful testing is needed and a precalibration will be performed at -25°C, the defined working temperature of the detector. A teststation has been developed using cosmic particles transversing the $PbW0_4$-crystals. Cosmic events are selected by two compact trigger detectors. Each of them contains a 4x4 array of scintillators, which are read out by silicon photomultipliers (SiPMs). The poster presents the setup of the teststation discussing in detail the different electronic components used.
Supported by the BMBF.

HK 48.44 Wed 17:00 C/Foyer

Photonen-Nachweis und Untergrundstudien im HADES* RICH in Ni + Au und Au + Au Reaktionen — •Tobias Kunz für die HADES-Kollaboration — Physik Dept. E12, Technische Universität München

Im HADES-Experiment an der GSI, Darmstadt, werden Elektronen und Positronen mit einem hadronblinden RICH-Detektor identifiziert, der das Cherenkovlicht mit einem photosensitiven Gasdetektor nachweist. Für ein quantitatives Verständnis der e^+e^--Nachweiswahrscheinlichkeit wurde das Ansprechverhalten des Photonendetektors untersucht, der mit neuer Ausleseelektronik ausgestattet wurde. Dafür wurde der Detektor mit einer speziellen Lichtquelle bestrahlt, die bei einer Rate von ca. 500 Hz einzelne Photonen im VUV-Bereich emittiert. Die Signale wurden mit denen von e^+e^- induzierten Cherenkov-Ringen aus voll rekonstruierten π^0-Dalitz-Zerfällen ($\pi^0 \to \gamma e^+e^-$) in Au + Au Reaktionen bei E = 1.25 AGeV verglichen. Die erhaltenen Amplituden- und Padmultiplizitätsverteilungen für einzelne Photonen dienen als Grundlage für die vollständige Simulation des Detektors. Für die Analyse des von Hadronen induzierten Untergrundsignals im Detektor wurden Daten ohne Radiatorgas aus Ni + Au bei E = 1.25 AGeV verwendet.
* Unterstützt durch BMBF(05P12WOGHH) und Excellence Cluster Universe

HK 48.45 Wed 17:00 C/Foyer

Properties of hydrogen cluster-jets — •Esperanza Köhler, Daniel Bonaventura, Silke Grieser, Ann-Katrin Hergemöller, Benjamin Hetz, Fabian Hordt, Hans-Werner Ortjohann, Alexander Täschner, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

A highly intense cluster-jet beam represents a very attractive and extremely interesting target for studies at storage ring experiments (e.g. $\bar{\mathrm{P}}$ANDA/FAIR) as well as for laser-induced particle acceleration. Since the target beam or rather the cluster properties vary with increasing number of constituents, the theoretical description of these many-body systems holds a lot of challenges. Therefore, it is essential to perform systematic measurements on cluster beam characteristics, in particular: the velocity, beam density, and cluster mass. The study of these correlated parameters enables the optimisation of the target design for highest performance and allows for insights into the cluster production process. This presentation will give an overview of the hydrogen cluster-jet target prototype for the $\bar{\mathrm{P}}$ANDA experiment. Furthermore, the systematic investigation of these mentioned cluster properties and their recent results will be presented and discussed.
Supported by EU (FP7), BMBF, and GSI F+E.

HK 48.46 Wed 17:00 C/Foyer

Production, properties, and probing of Laval Nozzles for Cluster-Jet Targets — •Silke Grieser, Daniel Bonaventura, Ann-Katrin Hergemöller, Benjamin Hetz, Fabian Hordt, Esperanza Köhler, Alexander Täschner, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

A cluster-jet target achieves high and constant beam densities, which can be adjusted during operation. Therefore, it is highly eligible for storage ring experiments. By the expansion of pre-cooled gases within fine Laval nozzles a cluster source produces a continuous flow of cryogenic solid clusters. Essential for the production of clusters are the properties of the Laval nozzle. The production of such a nozzle with its complex inner geometry represents a major technical challenge. To ensure the production of these fine Laval nozzles for future internal targets, an improved production process based on the initial CERN production was recently developed at the University of Münster. Systematic investigations on Laval nozzles with modified geometries will clarify the outstanding questions of the cluster production process. Moreover, this is very important for the deeper understanding of the cluster beam characteristics, in particular: the density, velocity, and mass, affected by the geometry of the nozzle. The production process and initial measurements with these new nozzles at the $\bar{\mathrm{P}}$ANDA cluster-jet target prototype will be presented and discussed.
Supported by EU (FP7), BMBF, and GSI F+E.

HK 48.47 Wed 17:00 C/Foyer

Design and Construction of the Cluster-Jet Target for $\bar{\mathrm{P}}$ANDA — •Ann-Katrin Hergemöller, Daniel Bonaventura, Silke Grieser, Benjamin Hetz, Fabian Hordt, Esperanza Köhler, Alexander Täschner, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

Cluster-jet targets are highly suited as internal targets for storage ring experiments. Hence, the first target to be operated at the $\bar{\text{P}}$ANDA experiment at the future accelerator center FAIR will be a cluster-jet target. In such a target the cluster beam itself is formed due to the expansion of pre-cooled gases within a Laval nozzle. Afterwards an orifice, the skimmer, separates the cluster beam from the residual gas and a second orifice, the collimator, defines its final size and shape. A prototype for the cluster-jet target for $\bar{\text{P}}$ANDA has already been built up in full $\bar{\text{P}}$ANDA geometry at the University of Münster and operates successfully for years. In combination with a nozzle tilting system allowing for an adjustment of the nozzle system relative to the experimental setup, the prototype provides a target thickness of more than 2×10^{15} $\frac{\text{atoms}}{\text{cm}^2}$. Based on the results of the performance of this prototype, the final cluster-jet target source was designed and constructed in Münster as well. In this presentation an overview of the cluster-jet target design, various special features and first performance results will be presented and discussed.
Supported by EU (FP7), BMBF, and GSI F+E.

HK 48.48 Wed 17:00 C/Foyer

Commissioning of the scatter component of a Compton camera consisting of a stack of Si strip detectors — •S. Liprandi[1], S. Aldawood[1,2], T. Marinsek[1], J. Bortfeldt[1], L. Maier[3], C. Lang[1], H. van der Kolff[1,4], I. Castelhano[1,5], R. Lutter[1], G. Dedes[1], R. Gernhäuser[3], D. R. Schaart[4], K. Parodi[1], and P. G. Thirolf[1] — [1]LMU Munich, Garching, Germany — [2]King Saud University, Riyadh, Saudi Arabia — [3]TU Munich, Garching, Germany — [4]TU Delft, The Netherlands — [5]University of Lisbon, Lisbon, Portugal

At LMU Munich in Garching a Compton camera is presently being developed aiming at the range verification of proton (or ion) beams for hadron therapy via imaging of prompt γ rays from nuclear reactions in the tissue. The poster presentation focuses on the characterization of the scatter component of the Compton camera, consisting of a stack of six double-sided Si strip detectors (50×50 mm^2, 0.5 mm thick, 128 strips/side). The overall 1536 electronics channels are processed by a readout system based on the GASSIPLEX ASIC chip, feeding into a VME-based data acquisition system. The status of the offline and online characterization studies will be presented.

*Supported by the DFG Cluster of Excellence, MAP (Munich - Centre for Advanced Photonics)

HK 48.49 Wed 17:00 C/Foyer

Optical properties of the PANDA Barrel DIRC radiator bars — Grzegorz Kalicy[1,2], •Marvin Krebs[1,2], Klaus Peters[1,2], Carsten Schwarz[1], and Jochen Schwiening[1] for the PANDA-Collaboration — [1]GSI, Darmstadt — [2]Goethe Universität, Frankfurt

The PANDA experiment at the Facility for Antiproton and Ion Research in Europe (FAIR) at GSI, Darmstadt, will study fundamental questions of hadron physics and QCD. A fast focusing DIRC (Detection of Internally Reflected Cherenkov light) counter will provide hadronic particle identification (PID) in the barrel region of the PANDA detector. To meet the PID requirements, the Barrel DIRC has to provide precise measurements of the Cherenkov angle, which is conserved for Cherenkov photons propagating through the radiator by total internal reflection. The radiators, rectangular bars made from fused silica, have to fulfill very strict optical and mechanical requirements. This includes the squareness and parallelism of the sides of the bars, sharp corners, and a very smooth surface polish, ensuring that the Cherenkov photons reach the optical sensors without angular distortions. Currently the Barrel DIRC is at the final design stage and several different bar shapes and fabrication methods are being considered for the final detector. An optical setup, consisting of a computer-controlled positioning and a multi-wavelength laser system, is used to evaluate the radiator bars to obtain critical values like transmittance and reflectivity. The current results and techniques will be presented on this poster. Work supported by EU FP7 grant, contract no. 227431, HadronPhysics2, and HGS-HIRe

HK 48.50 Wed 17:00 C/Foyer

Characterization of Compton camera LaBr$_3$ absorber detector — •T. Marinsek[1], S. Aldawood[1,2], S. Liprandi[1], J. Bortfeldt[1], L. Maier[3], C. Lang[1], H. van der Kolff[1,4], I. Castelhano[1,5], R. Lutter[1], G. Dedes[1], R. Gernhäuser[3], D. R. Schaart[4], K. Parodi[1], and P. G. Thirolf[1] — [1]LMU Munich, Garching, Germany — [2]King Saud University, Riyadh, Saudi Arabia — [3]TU Munich, Garching, Germany — [4]TU Delft, The Netherlands — [5]University of Lisbon, Lisbon, Portugal

Detection of prompt γ rays from nuclear interactions between a particle beam and organic tissue using a Compton camera to determine the Bragg peak position is a promising way of ion-beam range verification in hadron therapy. The Compton camera consists of a stack of six double-sided Si-strip detectors acting as scatterers, while the other essential part - the absorber - is made of a $LaBr_3$ monolithic scintillator crystal ($50 \times 50 \times 30$ mm^3) with reflective side-surface wrapping, offering excellent time and energy resolution. Scintillation light induced in the crystal is detected by a 256-fold segmented multi-anode PMT. Prerequisite to reconstruct the γ source position is the determination of the photon interaction position in the crystal by applying "k-nearest neighbors" algorithm (van Dam et al., Nuclear Science (2011)) using the reference library of light distributions, obtained by performing a 2D scan of the detector using a strong collimated ^{137}Cs source. The status of the spatial resolution characterization will be presented.
* Supported by the DFG Cluster of Excellence, MAP (Munich-centre for Advanced Photonics).

HK 48.51 Wed 17:00 C/Foyer

TRITON and TILDA - Universal Control and Data Acquisition in Collinear Laser Spectroscopy Experiments. — •Simon Kaufmann for the TRIGA-SPEC-Collaboration — Institut für Kernchemie Mainz

TRIGA pyThon cONtrol system (TRITON) and TRIGA-Laser Data Acqusition (TILDA) are custom developments for the collinear laser spectroscopy (CLS) experiment TRIGA-Laser. The TRIGA-Laser experiment is a prototype for the LaSpec experiment at the low energy branch at the upcoming FAIR facility [1]. Situated at the research reactor TRIGA Mainz the TRIGA-Laser experiment benefits from the possibility to create short-lived nuclides by neutron-induced fission of a heavy actinide target, e.g. ^{249}Cf. In order to efficiently operate and control the setup, we have developed TRITON which is custom-built for the slow controls of our experiment. This will be completed by TILDA which will be responsible for the fast experiment control as well as time resolved data acquisition. The time resolution is necessary due to the bunched ion beam structure. Core of TILDA will be two field programmable gate arrays (FPGA)in a PXI rack. Modularity in TRITON and in TILDA is keeping both as flexible as possible and it is foreseen to use them in other CLS-setups like ALIVE and LaSpec. While TRITON is fully operational already, a prototype of TILDA with a small PCI-based FPGA was tested during commissioning.
TRITONs and TILDAs main features, specifications and status will be presented.
[1] D. Rodriguez et al., Eur. Phys. J. Special Topics 183, 1*123 (2010)

HK 48.52 Wed 17:00 C/Foyer

Ein schnelles Trigger-System für den CALIFA Detektor — Michael Bendel, Roman Gernhäuser, Benjamin Heiss, •Philipp Klenze, Patrick Remmels und Max Winkel — Physik Department E12, Technische Universität München

Das CALIFA Kalorimeter mit seinen etwa 2600 Szintillationskristallen ist eine der wesentlichen Komponenten des R^{3}B-Experiments. Für viele Experimente muss CALIFA komplexe Trigger-Entscheidungen, wie Energiesummen oder Multiplizitäten, mit minimaler Latenz treffen. Hier ist die Auswahl von bestimmten Triggermustern ein wesentliches Werkzeug zur präzisen Vorauswahl von relevanten Ereignissen.

Durch geschickte hierarchische Summation können die dazu notwendigen Informationen innerhalb von 1 μs gesammelt und verarbeitet werden. Die Summationsschritte erfolgen in FPGAs auf eigens entwickelten Aufsteckmodulen für die universelle digitale Plattform FEBEX (GSI Darmstadt), die bereits zur Digitalisierung und Auslese von CALIFA genutzt wird.

Gefördert durch das BMBF, Kennzeichen 05P12WOFNF und 05P12WONUE, sowie durch das GSI Darmstadt.

HK 48.53 Wed 17:00 C/Foyer

Simulation studies of the hypernuclear experiment at $\bar{\text{P}}$ANDA to optimize the production and detection rates of $\Lambda\Lambda$ hypernuclei — Sebastian Bleser[1], Jürgen Gerl[2], Felice Iazzi[3], Jasmina Kojouharova[2], Ivan Kojouharov[2], Marta Martinez Rojo[1], Josef Pochodzalla[1,4], Torben Rathmann[4], Alicia Sanchez Lorente[1], and •Marcell Steinen[1] for the PANDA-Collaboration — [1]Helmholtz-Inst. Mainz — [2]GSI, Darmstadt — [3]Politec. and INFN, Torino — [4]Inst. für Kernphysik, JGU Mainz

A key aspect of the $\overline{\text{P}}$ANDA experiment at the future FAIR facility is the production and spectroscopy of $\Lambda\Lambda$ hypernuclei. The double hypernuclei are produced in a two-stage target system consisting of a primary in-beam filament to produce Ξ^- hyperons which are stopped and converted into two lambda hyperons in a secondary external target. This device is composed of a sandwich structure of layers of absorber material and silicon strip detectors for the formation of $\Lambda\Lambda$ hypernuclei and the detection of their charged decay pions. In particular the detection of these pions give a signature of a $\Lambda\Lambda$ hypernuclei and tag the event. The high resolution γ spectroscopy of the excited hypernuclei is performed by an array of germanium detectors.
This poster shows the simulation studies to optimize the setup concerning the production of the hypernuclei and the tracking of their decay pions. In addition the absorption of γ in the target material is taken into account. Furthermore the influence of background is studied since it might damage the germanium detectors and on the other hand is crucial to provide a good signal-to-noise ratio.

HK 48.54 Wed 17:00 C/Foyer

Detection system for forward emitted XUV photons from relativistic ion beams at the ESR — V. Hannen[1], Th. Kühl[2,3,4], W. Nörtershäuser[2,3], H.-W. Ortjohann[1], R. Sánchez[3], Th. Stöhlker[3,4,5], J. Vollbrecht[1], Ch. Weinheimer[1], D. Winters[3], and •D. Winzen[1] — [1]Institut für Kernphysik, Uni Münster — [2]Institut für Kernchemie, Uni Mainz — [3]GSI, Darmstadt — [4]Helmholtz Institut Jena — [5]Uni Jena

Highly charged heavy ions stored at relativistic velocities provide a unique possibility to test atomic structure calculations. We would like to study effects of electron-electron correlations in Be-like krypton ($^{84}Kr^{32+}$) via a laser spectroscopy measurement of the $^3P_1 - ^3P_0$ transition. For this purpose the krypton ions are stored at $\beta \approx 0.69$ in the Experimental Storage Ring (ESR). By interacting with counter-propagating laser pulses the laser frequency is Doppler shifted by more than one order of magnitude, thus being able to excite the krypton ions to the desired state. Additionally the large Doppler "boost" also shifts the fluorescence from $\lambda_0 \approx 17$ nm to $\lambda \approx 9$ nm and directs it into a narrow forward cone. To collect the light a movable cathode plate is brought into the vicinity of the beam. XUV photons hitting the plate produce mostly low energetic (<3 eV) secondary electrons. The electrons will be electromagnetically guided onto a MCP detector. The design and working principle, as well as results of first test measurements with the XUV detection system, will be presented. This work is supported by BMBF under contract number 05P12PMFAE. D. Winzen thanks HGS-HIRe for FAIR for funding his scholarship.

HK 48.55 Wed 17:00 C/Foyer

Simulation of the multi-neutron detection at NeuLAND with improved detector response — •Vadim Wagner[1], Joachim Enders[1], and Dmytro Kresan[2] for the R3B-Collaboration — [1]Institut für Kernphysik, TU Darmstadt — [2]GSI Helmholtzzentrum für Schwerionenforschung

The future large-area neutron detector NeuLAND for the R3B experiment at FAIR is bound to detect neutrons from reactions of exotic nuclei. Among the challenges are the detection of low-energy neutrons with good resolution as well as the simultaneous detection of up to four neutrons.

This contribution presents simulation results with an improved representation of the detector response for NeuLAND in the R3BRoot framework. From the present results, an energy resolution for a single neutron of 13 keV can be expected. A two-dimensional reconstruction of the neutron multiplicity allows 4n events to be reconstructed with an efficiency of about 56%, an increase of about 60% with respect to previous simulations.

Supported in part by the state of Hesse through the LOEWE center HIC for FAIR.

HK 48.56 Wed 17:00 C/Foyer

The STS-XYTER ASIC – a dedicated front-end chip for the CBM Silicon Tracking System — •Iurii Sorokin[1,2], Krzysztof Krzysztof[3], Rafal Kleczek[3], Piotr Otfinowski[3], Volker Kleipa[1], and Robert Szczygiel[3] for the CBM-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt — [2]Kiev Institute for Nuclear Research, Kiev — [3]AGH University of Science and Technology, Cracow

The STS-XYTER is a 128-channel charge-sensitive front-end chip, designed specifically for the Silicon Tracking System of the CBM experiment. The chip features a self-triggering architecture, which enables it to measure the signal amplitude and the time of arrival in each input channel autonomously, as soon as the signal in the given channel exceeds a predefined threshold. The design time resolution is about 10 ns, the dynamic range is 15 fC, and the amplitude is digitized with an integrated 5-bit flash ADC. Two shapers with distinct rise times are used to achieve low rate of noise hits in combination with the good time resolution, and low power consumption (6 mW/channel). The characterization of chips samples is ongoing. An overview of the chip architecture as well as the operation principle will be given.

HK 48.57 Wed 17:00 C/Foyer

Auslesekomponenten für den $\overline{\text{P}}$ANDA MVD Streifen-Detektor* — •Robert Schnell[1], Kai-Thomas Brinkmann[1], Valentino Di Pietro[1,5], Harald Kleines[3], André Goerres[2], Alberto Riccardi[1,5], Angelo Rivetti[5], Manuel Rolo[5], Helmut Sohlbach[4] und Hans-Georg Zaunick[1] für die PANDA-Kollaboration — [1]II. Physikalisches Institut, JLU Gießen — [2]IKP-1, FZ Jülich — [3]ZEA-2, FZ Jülich — [4]FH Südwestfalen, Iserlohn — [5]INFN - Sezione di Torino

Das $\overline{\text{P}}$ANDA-Experiment am zukünftigen Beschleunigerzentrum FAIR in Darmstadt wird Reaktionen von Antiprotonen mit stationären Targets (Wasserstoff und schwere Kerne) untersuchen. Der Mikro-Vertex-Detektor (MVD) als zentraler Tracking-Detektor soll hoch aufgelöste Spurvermessung und das Erkennen sekundärer Vertizes mit einer Auflösung von bis zu 100 μm ermöglichen. Dazu werden Hybrid-Pixel-Sensoren und doppelseitige Silizium-Streifen-Sensoren eingesetzt.

Bei den Entwicklungen für die Auslese des Streifen-Detektors sind die speziell für den $\overline{\text{P}}$ANDA MVD entwickelten ASICs besonders hervorstechend, zum einen der selbst-triggernde Front-End Chip zur Auslese der Streifen-Sensoren sowie der Module Data Concentrator Chip zur Bündelung und Reduzierung der Daten. Der Datentransfer soll durch den am CERN entwickelten GigaBit Transceiver (GBT) Link erfolgen. Die Daten werden mittels auf FPGA basierenden MTCA.4 Einschubkarten empfangen und an das globale System zur Ereignisauswahl weitergeleitet.

*Unterstützt vom BMBF, HICforFAIR und JCHP.

HK 48.58 Wed 17:00 C/Foyer

Current status of the MR-TOF-MS at the FRS Ion Catcher — •Christine Hornung for the FRS Ion Catcher-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen, Germany

The multiple-reflection time-of-flight mass spectrometer (MR-TOF-MS) is part of the FRS Ion Catcher, which is a test facility for the future Low-Energy Branch (LEB) of the Super-FRS at FAIR. At the FRS Ion Catcher, projectile and fission fragments are produced at relativistic energies, separated in-flight and range-focused at the FRS. Further they are slowed-down and thermalized in a cryogenic stopping cell (CSC) to kinetic energies of a few eV. In the MR-TOF-MS the ions are accumulated, cooled and ejected in bunches by a linear RF-trap. In the analyzer they are reflected multiple times to enlarge their flight path by orders of magnitude to enhance the resolution. The MR-TOF-MS can perform high precision mass measurements and in addition it can separate the ion of interest from isobaric contaminations for further experiments. It is a well suitable diagnostic device for operation of the CSC.

The performance of the MR-TOF-MS has been enhanced by increasing the kinetic energy of the ions to 1300 eV and improving the stability of the voltages. In the recent experiment the mass resolving power has been increased to exceed 400.000 FWHM for several fission fragments.

HK 48.59 Wed 17:00 C/Foyer

Aufbau eines automatischen Infrarot-Laser-Teststands für Silizium-Streifen-Detektoren* — •Martin Kesselkaul, Kai-Thomas Brinkmann, Tommaso Quali, Robert Schnell, Benjamin Wohlfahrt und Hans-Georg Zaunik für die PANDA-Kollaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

Im Rahmen des $\overline{\text{P}}$ANDA-Experiments am zukünftigen Beschleunigerzentrum FAIR sollen Vernichtungsreaktionen des Antiprotonenstrahls mit Protonen des stationären Targets (Wasserstoff und schwere Kerne) untersucht werden. Als Teil des Trackingdetektors soll der Mikro-Vertex-Detektor hoch auflösendes Tracking und das Erkennen sekundärer Vertizes ermöglichen.
Dieser Beitrag betrachtet den Aufbau eines Infrarot-Laser-Teststands sowie die Entwicklung einer entsprechenden Laseransteuerung. Mittels eines hochpräzisen xy-Tisches wird die auf 50 nm genaue Positionie-

rung des Lasers realisiert. Dies ermöglicht die Charakterisierung und Qualitätskontrolle von doppelseitigen Silizium-Streifen-Detektoren für den $\overline{\text{P}}$ANDA MVD. Dabei müssen Laseransteuerung, Positionierung und Datenerfassung für die Halbleiter-Sensoren synchronisiert werden. Einzelne Komponenten und der Betrieb des Gesamtsystems werden vorgestellt.

* Gefördert durch BMBF und HIC for FAIR.

HK 48.60 Wed 17:00 C/Foyer

Towards multi-hit readout of TPCs for exotic beam tracking — •Timothy Allred[1], Joachim Enders[1], Jan-Paul Hucka[1], Chiara Nociforo[2], Stephane Pietri[2], Andrej Prochazka[2], and Steffen Schlemme[1] — [1]Institut für Kernphysik, TU Darmstadt — [2]GSI Helmholtzzentrum für Schwerionenforschung

The Super-FRS [1] beam diagnostics system supports the set up and adjustment of the separator and provides tracking and event-by-event particle identification. A TPC-type detector with GEM amplification and with multi-hit single-strip readout is proposed to be used as a tracking detector. The main challenges for such a detector are position resolution below 1 mm, high dynamic range (1000) and high-efficiency tracking up to 10 MHz ion rate.

One of the planned improvements towards a high-rate capability of single-ion tracking is the multi-hit readout of the TPC detectors [2]. Present TPC detectors with delay-line readout were tested with multi-hit electronics at the GSI fragment separator FRS [3] with Au beam at 1 GeV/nucl. up to 150 kHz. Results will be presented in comparison to single-hit readout.

[1] M. Winkler et al., NIM B 266 (2008) 4183
[2] R. Janik et al., NIM A 640 (2011) 54
[3] H. Geissel et al., NIM B 70 (1992) 286

Supported in part by the State of Hesse through the LOEWE center HIC for FAIR.

HK 48.61 Wed 17:00 C/Foyer

Rate-dependent performance of ion chambers for particle-ID at the GSI fragment separator — •Jan-Paul Hucka[1], Timothy Allred[1], Joachim Enders[1], Roman Gernhäuser[2], Steffen Maurus[2], Chiara Nociforo[3], Stephane Pietri[3], and Andrej Prochazka[3] — [1]Institut für Kernphysik, TU Darmstadt — [2]Physik Department, TU München — [3]GSI Helmholtzzentrum für Schwerionenforschung

At the GSI Fragment Separator (FRS [1]), multi-sampling ion chambers (MUSIC [2]) emplyoing a Frisch grid are used for charge identification of secondary ion beams. At the FAIR Super-FRS, higher rates are expected, and an event-by-event determination of the charge of secondary ions will be needed at rates of several 100000 events per second. The comparison of results from test measurements for the MUSIC performance with that of a recently constructed [3] tilted-electrode gas ion chamber (TEGIC), which was designed similar to the one discussed in Ref. [4], will be presented.

[1] H. Geissel et al., NIM B 70, 286 (1992)
[2] http://www-w2k.gsi.de/frs/technical/FRSsetup/detectors/music80/music80_manual.pdf
[3] S. Maurus, Thesis, TU München; S. Maurus et al., this conference
[4] K. Kimura et al., NIM A 538, 608 (2005)

Supported in part by the State of Hesse through the LOEWE center HIC for FAIR.

HK 48.62 Wed 17:00 C/Foyer

Performance of a scintillator hodoscope for detecting entangled electron pairs — •Marius Peck[1], Steffen Schlemme[1], Kazimierz Bodek[2], Pawel Caban[3], Jacek Ciborowski[4], Michal Dragowski[4], Joachim Enders[1], Adam Kozela[5], Jakub Rembielinski[3], Dagmara Rozpedzik[2], Marta Wlodarczyk[4], and Jacek Zejma[2] — [1]TU Darmstadt, Darmstadt, Germany — [2]Jagiellonian University, Cracow, Poland — [3]University of Lodz, Lodz, Poland — [4]Warsaw University, Warsaw, Poland — [5]Institute of Nuclear Physics PAS, Cracow, Poland

In the framework of a Polish-German collaboration aimed at investigating quantum entanglement of ultra-relativistic electrons following Moeller scattering [1] a test experiment has been carried out at the superconducting Darmstadt electron linear accelerator S-DALINAC [2]. The Moeller pairs undergo polarization analysis by means of Mott scattering. In the test experiment, the scattered electrons were tracked in drift chambers and detected by a scintillator hodoscope. The properties of this detector arrangement has been investigated off-line with radioactive sources. Results will be presented and an outlook for future improvement of the setup will be given.

[1] K. Bodek et al., AIP Conf. Proc. 1563, 208 (2013).
[2] S. Schlemme et al., this conference.

Supported in part by DFG (SFB 634), DAAD, the Polish Ministry of Science and Higher Education, and the Polish National Science Centre grants UMO-2012/06/M/ST2/00430 and DEC-2013/08/S/ST2/00551.

HK 48.63 Wed 17:00 C/Foyer

Experimental considerations for quantum-entanglement studies with relativistic fermions — •Steffen Schlemme[1], Marius Peck[1], Kazimierz Bodek[2], Pawel Caban[3], Jacek Ciborowski[4], Michal Dragowski[4], Joachim Enders[1], Adam Kozela[5], Jakub Rembielinski[3], Dagmara Rozpedzik[2], Marta Wlodarczyk[4], and Jacek Zejma[2] — [1]TU Darmstadt, Darmstadt, Germany — [2]Jagiellonian University, Cracow, Poland — [3]University of Lodz, Lodz, Poland — [4]Warsaw University, Warsaw, Poland — [5]Institute of Nuclear Physics PAS, Cracow, Poland

The QUEST (Quantum entanglement of Ultra-relativistic Electrons in Singlet and Triplet states) project is aimed at the determination of the electron spin correlation function at relativistic energies. Electron pairs are created through Moeller scattering, and polarization observables are planned to be measured in Mott scattering. The predicted spin correlation function is energy dependent with values of several per cent at energies of 10 - 20 MeV.

The results of a first test experiment at the S-DALINAC were not sensitive enough to detect entangled and Mott-scattered electron pairs at the expected energies. Further steps are either to improve the former setup or design a new polarimeter for lower energies to improve statistics due to the higher scattering cross sections. This contribution presents general considerations, test results, and an outlook.

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HK 48.64 Wed 17:00 C/Foyer

^{83m}Kr for Calibration and Energy Resolution Studies of GEM-TPCs — •Roman Schmitz for the GEM-TPC-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn

Time Projection Chambers are excellent detectors for full three-dimensional tracking of particles. The number of readout channels is usually of the order $\mathcal{O}(10^3 - 10^5)$ and therefore a precise calibration is necessary to achieve optimal energy resolution and particle identification performance. Radioactive ^{83m}Kr is a perfectly suited source for calibration of such a detector. It delivers an energy spectrum matching the typical energy loss of different particle types inside the detector and has a sufficiently short half-life to perform normal operation after a few hours.

Results on absolute and relative calibration of two GEM-TPCs with ^{83m}Kr are shown as well as the impact on specific energy loss performance. Resolution studies have been performed taking into account theoretically possible performance and noise contributions.

This work is supported by DFG SFB/TR 16.

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A Time Projection Chamber for the Crystal Barrel experiment at ELSA — •Dimitri Schaab, Markus Ball, Reinhard Beck, and Bernhard Ketzer for the CBELSA/TAPS-Collaboration — HISKP Bonn University, Nussallee 14-16, D-53115 Bonn

The CBELSA/TAPS experiment focuses on baryon spectroscopy by photoproduction processes off nucleons. For this purpose the experiment consists of an inner detector and an outer detector. The outer Crystal Barrel detector mainly measures photons from the decaying resonance. For charged particle identification and in order to obtain their direction, the Inner Detector consists of three layers of scintillating fibers. This inner detector will be replaced by a Time Projection Chamber (TPC). It offers improved track reconstruction capabilities, a robust pattern recognition and, if operated in a magnetic field, an excellent momentum resolution. Moreover, one obtains a particle identification of charged particles via the specific energy loss.

A TPC has been developed for the FOPI experiment which also fits to the Crystal Barrel dimensions. It operates in continuous mode using Gas Electron Multipliers (GEM) as pre-amplification stage. For the TPC detector the calibration of the detector is crucial since parameters such as drift velocity or field inhomogenities have a direct impact on the detector performance. For the CBELSA TPC a calibration system is planned, which is based on the T2K calibration system. Here, the

photoelectric effect is used to release electrons at well-known positions on the cathode, which drift towards the readout plane and show the integrated spatial distortions.

HK 48.66 Wed 17:00 C/Foyer

Effects of high count rates on the signals from GEM-based detectors — •Konstantin Münning[1], Bernhard Ketzer[1], Markus Ball[1], and Christian Lippmann[2] for the ALICE-Collaboration — [1]Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany — [2]GSI - Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

Future upgrades of accelerator-based particle physics experiments aim at drastically increased event rates and challenge both detector and readout performance. At high count rates in particle detectors effects like signal pileup, baseline shift and fluctuations become important.

Large size GEM detectors as envisaged e.g. for the ongoing ALICE TPC upgrade have the advantage of delivering a fast signal without ion tail in comparison to wire chambers but the large capacitive coupling between channels via the GEM electrode facing the readout pads leads to significant baseline shift and fluctuations (common mode effect).

The poster is presenting the work on quantifying the common mode effect as a function of rate and the result of application of different filters in the digital data path. The results are needed for the design finalization of the read out electronics to be used at ALICE and other experiments.

Supported by the BMBF and the EU.

HK 48.67 Wed 17:00 C/Foyer

The NUSTAR Data Acquisition — •B. Löher[1,2], J. Agramunt[3], M. Bendel[4], A. Charpy[5], P. Coleman-Smith[6], A. Czermak[7], R. Gernhäuser[4], A. Heinz[5], H.T. Johansson[5], N. Kurz[2], I.H. Lazarus[6], T. Le Bleis[4], C. Nociforo[2], S. Pietri[2], V.F.E. Pucknell[6], H. Schaffner[2], H. Scheit[1], H. Simon[2], J. Taieb[8], H.T. Törnqvist[1,2], and M. Winkel[4] — [1]TU Darmstadt — [2]GSI — [3]IFIC, CSIC, Spain — [4]TU München — [5]Chalmers University of Technology, Sweden — [6]STFC Daresbury, UK — [7]IFJ, Poland — [8]CEA, France

The diversity of upcoming experiments within the NUSTAR collaboration, including experiments in storage rings, reactions at relativistic energies and high-precision spectroscopy, is reflected in the diversity of the required detection systems. A challenging task is to incorporate the different needs of individual detectors within the unified NUSTAR Data AcQuisition (NDAQ). NDAQ takes up this challenge by providing a high degree of availability via continuously running systems, high flexibility via experiment-specific configuration files for data streams and trigger logic, distributed timestamps and trigger information on km distances, all built on the solid basis of the GSI Multi-Branch System. NDAQ ensures interoperability between individual NUSTAR detectors and allows merging of formerly separate data streams according to the needs of all experiments, increasing reliability in NUSTAR data acquisition. An overview of the NDAQ infrastructure and the current progress is presented. *Supported by HIC for FAIR, GSI-TU Darmstadt cooperation, and BMBF project 05P12RDFN8

HK 48.68 Wed 17:00 C/Foyer

An FPGA-based Sampling-ADC Readout for the Crystal Barrel Calorimeter — •Johannes Müllers[1] and Pawel Marciniewski[2] for the CBELSA/TAPS-Collaboration — [1]Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, Germany — [2]Angströmlaboratoriet, Uppsala, Sweden

The CBELSA/TAPS experiment at the electron accelerator ELSA (Bonn) investigates the photoproduction of mesons off protons and neutrons.

Presently the readout of the CsI(Tl)-crystals of the Crystal Barrel calorimeter is being upgraded from a PIN-diode readout to an APD readout to create a fast signal for first-level-triggering. This will increase the trigger efficiency especially for final states with only neutral particles substantially.

To increase the possible data readout rate, which is currently limited by the digitization stage (LeCroy QDC 1885F) to ≈ 2 kHz, the implementation of a new Sampling-ADC (SADC) readout is being prepared.

Based on the 64-channel PANDA-SADC, the CB-SADC design was modified and adapted to the needs of the CBELSA/TAPS experiment. It offers 64 channels in one NIM module, together with modular analog or FPGA-based digital shaping. The data transfer will be realized by two standard gigabit links. Using an FPGA together with SADCs provides a multitude of possibilities for online feature extraction, such as the determination of the energy deposited in the crystal, TDC capabilities and pile-up detection and recovery.

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