HK 46: Poster

Zeit: Donnerstag 16:00–18:00 Raum: HZ Poster

HK 46.1 Do 16:00 HZ Poster

Simulations of the Measurement of the Form Factor for the Ds Semileptonic Decay with the PANDA Detector — •Lu Cao and James Ritman — Institut für Kernphysik, Forschungszentrum Jülich, D-52425 Jülich, Germany

The PANDA experiment is one of the major projects of the FAIR facility in Darmstadt and will study a wide range of physics topics in the high energy region. One of the interesting topics is the semileptonic D_s decays governed by both the weak and strong forces, where the strong interaction effects can be parameterized by the transition form factor. Techniques such as lattice QCD offer increasingly precise calculations, but as the uncertainties shrink, experimental validation of the results becomes increasingly important. The achievable performance of the PANDA detector for these types of reactions has not yet been studied in detail; however, this is expected to work very well based upon the design performance and experience with other detector systems.

This report summarizes the simulation and reconstruction status of the D_s decay chain at PANDA. In the reconstruction procedure, we focus on developing the software and evaluating the expected precision of these measurements with the Monte Carlo simulation studies of the physics performance of the PANDA detector. The related decay models in this chain are checked via Dalitz plot analysis; the present version of EvtGen in PANDAROOT has been enhanced by a new model describing the $D_s \to K^+K^-\pi^-$ decay. With the help of theoretical predictions of the cross section, the production rate is estimated.

HK 46.2 Do 16:00 HZ Poster

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HK 46.3 Do 16:00 HZ Poster

A Geant4 based MC simulation for the COMPASS-II experiment at CERN — •Tobias Szameitat, Horst Fischer, Matthias Gorzellik, Arne Gross, Philipp Jörg, Kay Königsmann, Christopher Regali, Katharina Schmidt, Stefan Sirtl, and Johannes ter Wolbeek — for the COMPASS collaboration, Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

The COMPASS-II experiment at CERN is a fixed-target experiment for the investigation of the spin structure of the nucleon and for hadron spectroscopy. The theoretical framework of Generalized Parton Distributions (GPDs) provides a dynamical and geometrical picture of the nucleon. Experimentally the GPDs can be accessed in exclusive measurements such as Hard Exclusive Meson Production and Deeply Virtual Compton Scattering. Built as a multi-purpose two stage spectrometer, the COMPASS-II experiment allows for measurements of such exclusive reactions. For a detailed understanding of the spectrometer acceptance a new Geant4 based simulation tool has been developed. We report on the key features of the software including its different detector geometries and its event simulation. Supported by BMBF, DFG and EU FP7 (Grant Agreement 283286).

HK 46.4 Do 16:00 HZ Poster

ΣN cusp effect and angular distributions in the the CMS frame in the $\vec{p}p \to pK^+\Lambda$ reaction — •Sedigheh Jowzaee for the COSY-TOF-Collaboration — IKP-1, Forschungszentrum Jülich, Germany — Jagiellonian University, Krakow, Poland

The $\vec{p}p \to pK^+\Lambda \to pK^+p\pi^-$ reaction has been measured with the COSY-TOF spectrometer with a polarized beam at a momentum of 2.95 GeV/c. Due to the full phase space covered by the COSY-TOF experiment, the Dalitz plot can be analyzed to study the details of the reaction mechanism. The Dalitz plot distribution reveals an influence of pΛ final state interaction (FSI), N^* resonances and cusp effects at the $\Sigma^0 p$ threshold as an enhancement in the $p\Lambda$ subsystem. The cusp effects is more pronounced than measured at a beam momentum of 2.7 GeV/c. Moreover, the cusp shape due to the interference with N^* resonances is studied in different regions of the $K\Lambda$ subsystem. The angular distribution of products in the CMS are also studied to determine the coefficients of Legendre polynomials by fitting to angular distribution of the reaction. The preliminary results of this analysis will be shown in this presentation.

HK 46.5 Do 16:00 HZ Poster

Absolute Photon Flux and $\gamma p \to p\pi^0$ Cross Section Determination at the BGO-OD Experiment* — Marvin Bleckwenn, Daniel Geffers, and •Thomas Zimmermann for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn

The BGO-OD experiment, presently under construction at the electron accelerator ELSA at Bonn university, is intended for the systematic investigation of the photo-production of mesons.

It consists of the highly segmented BGO-Ball with a particle tracking spectrometer at forward angles. The BGO-Ball is ideal for the identification of multi-photon final states with accurate time and energy resolution. The forward spectrometer combines a magnetic field with a series of tracking detectors, drift chambers and time of flight walls, allowing precise momentum reconstruction of forward travelling particles.

As proof for correct functionality of the BGO-OD experiment and the analysis, the π^0 cross section was determined. This required measurement of the absolute photon flux and simulation of the experimental acceptance.

*Supported by the DFG (SFB/TR-16)

HK 46.6 Do 16:00 HZ Poster

Simulation and Analysis of the channel $\bar{p}p \to e^+e^-\pi^0$ using the TDA production mechanism for its measurement with PANDA. — •María Carmen Mora Espí, Manuel Zambrana, and Frank Maas for the PANDA-Collaboration — Helmholtz-Institut Mainz, Mainz, Deutschland

The Transition Distribution Amplitudes (TDA) are universal non-perturbative objects describing the transition between two different particles. The TDA production mechanism can be used in the factorised description of hard processes which can be produced in PANDA at FAIR. One of these processes is the proton-antiproton annihilation into a lepton pair with high invariant mass q2 in association with a neutral pion of low transverse momentum, $\bar{p}p \to e^+e^-\pi^0$. Detailed simulation studies for the measurement of this channel have been performed including the separation of the signal channel from its main background channel ($\bar{p}p \to \pi^+\pi^-\pi^0$) as well as the study of the reconstruction efficiency of the signal. The preliminary results and the first conclusions are presented here together with a short discussion over the possible access of the TDA with PANDA.

HK 46.7 Do 16:00 HZ Poster

Measurement of electromagnetic time-like form factors of protons in BESIII — •Cristina Morales[1], Frank E. Maas[1], Paul Larin[1,2], and Dexu Lin[1] — [1]Helmholtz-Institut Mainz, SB1, Johann-Joachim-Becher-Weg 36, 55128 Mainz — [2]Institut für Kernphysik, Universität Mainz, Germany

The electromagnetic form factors of protons in the time-like region are re-viewed. We present the current status of the field and emphasize the relevant role of initial state radiation processes studied in high luminosity storage rings, such as the tau-charm factory BEPCII, i.e. BES-III experiment. We also present expectations from BES-III energy-scan

measurements around the proton production threshold and above.

HK 46.8 Do 16:00 HZ Poster

P2 - High precision determination of the Weak Mixing Angle - Detector Design — •Kathrin Gerz — Institut für Kernphysik, Mainz, Deutschland

P2 is going to extract a highly precise value of the Weak Mixing Angle from a measurement of the parity violating asymmetry in the electron proton scattering. The determination of this key parameter of the electroweak interaction is an essential test of the Standard Model's validity.

Preparations for this experiment have started in early 2012. The poster is going to address design concepts and feasibility studies.

HK 46.9 Do 16:00 HZ Poster

Technical Development of the Backward End-Cap (BWEC) for the PANDA Electromagnetic Calorimeter (EMC) — •Roserio Valente[1,2], Luigi Capozza[1], Frank Maas[1,2], Oliver Noll[1], David Piñeiro[1,2], and Dexu Lin[1] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz - Johannes Gutenberg-Universität-Mainz 55099 Mainz — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH/Planckstraße 164291 Darmstadt

The EMC will play a very important role in the PANDA multipurpose target spectrometer at FAIR. It will be made of a total of 15484 PbWO4 crystals and subdivided into three parts: a central barrel, a forward and a backward end-cap. The EMC backward region is a strategic location for the assembling of the whole detector. Through this point all services needed by the inner detectors, such as cooling, power supply and signal readout are routed into the spectrometer. These constraints, together with the need of maximising hermeticity and the other functional requirements of the whole EMC, impose to the BWEC particularly high dimensional accuracy, structural and temperature stability. Different designs were studied to meet the geometrical requirements. To maximise the scintillation light output, the crystals need to be cooled to about -25°C with a temperature stability of +/- 0.1°C. A cooling network is being developed and will be manufactured by selective laser sintering. Pressure drop calculations, finite element simulations and heat insulation optimisation were performed to show that the temperature requirements can be fulfilled using the leakless (low pressure) cooling system available for all PANDA subdetectors.

HK 46.10 Do 16:00 HZ Poster

The APD High Voltage Board Characterization Station for the Crystal Barrel Calorimeter — •Dimitri Schaab for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Nussallee 14-16, 53115 Bonn, Germany

The Crystal Barrel experiment investigates the inner dynamics of nucleons by baryon spectroscopy in photoproduction processes.
In order to enhance the acceptance for the photoproduction off the neutron a major hardware upgrade has been initialized in the past. It is about the upgrade from the currently used PIN-photodiode readout to a readout with avalanche-photodiodes (APD). The new concept provides a faster timing signal and allows the main calorimeter, which consists of 1230 scintillator crystals, to be part of the first level trigger stage.
The complete front-end electronics has been re-designed where the high voltage supply board is adapted to the temperature sensitive gain of the APDs. Before the electronics can be built into the calorimeter all supply boards have to be tested and characterized. The main tasks of the characterization station is to calibrate the on-board voltage measurement circuits and the voltage control as well as to test the functionality of the temperature compensation.
The performance and results of the APD High Voltage Board Characterization Station will be presented.
Supported by the Deutsche Forschungsgemeischaft (SFB/TR16) and Schweizerischer Nationalfonds.

HK 46.11 Do 16:00 HZ Poster

Is the four-phonon G.D.R. implicated in fission? — Genevieve Mouze and •Christian Ythier — Faculté des Sciences,Université de Nice, 06108 Nice cedex 2,France

The non-fissility with thermal neutrons of the 238 uranium system results from the too small clusterization energy E(cl) created when the system changes into 208 lead + 31 neon or 209 lead + 30 neon [1]. Indeed, it becomes fissile only when E(cl), at the most equal to 49.97 MeV at E(n) = 0, reaches 51.47 MeV at E(n) = 1.5 MeV. We suggest that this fissility does not simply result from a core-cluster collision destroying the lead core, since E(cl) is too small for overcoming the corresponding Coulomb barrier of 88.33 MeV, but rather from a combined shifting of the 82 protons of the lead core against the whole neutron phase, i.e. from a four-phonon giant dipole resonance, since E(cl) reaches about four times the G.D.R. energy of 238 uranium. We suggest that this 4-phonon G.D.R. triggers the nucleon phase of the fission reaction, a phase characterized by an uncertainty in the energy as great as 3.87 GeV, the ephemeral disappearance of any proton charge, and a lifetime of 0.17 ys. [1] G. Mouze, Nuovo Cimento A 106 (1993) 835 , A 103(1990) 617.

HK 46.12 Do 16:00 HZ Poster

From the law of Flynn to the Pyatkov effect — •Christian Ythier and Genevieve Mouze — Faculté des Sciences,Université de Nice, 06108 Nice cedex 2,France

The linear variation of the mean mass A(L) of the light fission products of an asymmetrically fissioning system as a function of its mass A(F) [1] results from the transfer of an almost constant number x(L) of nucleons from the primordial 208 lead core to the corresponding cluster of mass A(cl) = A(F) - 208. We show that A(L) = 82 + 1/2 A(cl) and that, without correction for prompt- neutron emission, x(L) equals 68 for the n-induced fission of 235 uranium and 60 for the spontaneous fission of 252 californium. The variation law can now be written A(L) = 1/2 A (F) - 22, i.e. x(L) = 186 - 1/2 A (F) . We suggest that the x(L) nucleons can condense into a cluster if they are hindered from reaching the primordial cluster by the accidental interposition of the nascent heavy fragment, a core of 126 nucleons formed in the destruction of the lead core :This situation can be realized in the conditions chosen by Pyatkov et al.[2] for observing the colinear ternary fission mode, i.e. the formation of clusters of mass 28(44), 126 and 68(60), with which 14(22) extra nucleons still can combine. [1] K.F. Flynn et al.,PRC, 5 (1972)1725 . [2] Yu.V. Pyatkov et al., EPJA, 45 (2010)20.

HK 46.13 Do 16:00 HZ Poster

Backtracking algorithm for lepton recontruction with HADES — •Patrick Sellheim for the HADES-Collaboration — Goethe-Universität Frankfurt

The HADES (High Acceptance Di-Electron Spectrometer) at the GSI Helmholtzzentrum für Schwerionenforschung investigates dilepton and strangeness production in elementary and heavy-ion collisions. In April - May 2012 HADES recorded 7 billion Au+Au events at a beam energy of 1.23 GeV/u with the highest multiplicities measured so far. The track reconstruction and particle identification in the high track density environment are challenging.
Most important detector component for lepton identification is a Ring Imaging Cherenkov detector. Its main purpose is the separation of electrons and positrons from large background of charged pions produced in heavy-ion collisions. In order to improve lepton identification a new backtracking algorithm was developed.
In this contribution we will show the results of a new backtracking algorithm compared to the currently applied method for $e^{-/+}$ identification. Efficiency and purity of a reconstructed $e^{-/+}$ sample will be discussed as well.
Supported by BMBF (05P12RFGHJ), Helmholtz Alliance EMMI, HIC for FAIR, HGS-HIRe and H-QM.

HK 46.14 Do 16:00 HZ Poster

study of the η meson in Pb-Pb collisions at $\sqrt{s_{NN}}$=2.76 TeV using the photon conversion method with ALICE — •Lucia Leardini — Physikalisches Institut, Heidelberg, Germany

The π^0 and η mesons are probes for studying the energy loss of the particles traveling through the hot and dense medium that forms after heavy-ions collisions, the Quark Gluon Plasma. Moreover, the study of the π^0 and η mesons in Pb-Pb collisions gives us an important reference with which to approach the direct photon measurement since they constitute its most important background.

The analysis is carried out using the Photon Conversion Method which exploits the ALICE Inner Tracking System (ITS) and the Time Projection Chamber (TPC) and makes possible measurements at low p_T with large significance. The data analyzed have been gathered during the 2011 and have a statistics eight times larger than the 2010 data. With the large statistics of the 2011 data it will be possible to measure the differential invariant cross section of the η meson as function of the transverse momentum up to a p_T of about 10 GeV/c in different centrality classes.

The results of the π^0 and η mesons from the 2011 data with the Pho-

ton Conversion Method with the ALICE detector will be presented.

HK 46.15 Do 16:00 HZ Poster

Centrality determination in Au-Au collisions at 1.23 AGeV with HADES — •Behruz Kardan and Christoph Blume for the HADES-Collaboration — Goethe-Universiät, Frankfurt am Main

The determination of the reaction centrality is essential in the study of the properties of extreme QCD matter, because it is directly related to the initial geometrical properties of the collision and allows the comparison of observables with other experiments and with theoretical calculations.

In HADES the charged particle multiplicity measured with different detectors is used as a centrality estimator for Au+Au collisions at 1.23 AGeV. Based on Glauber model simulation we deduce the geometrical properties, such as the number of participating nucleons and the number of binary nucleon-nucleon collisions, by fitting the simulated charged particle distributions to the measured data.

By comparing these results to simulations based on the UrQMD event generator the resolutions and possible biases of different centrality estimators are determined.

Supported by Helmholtz Alliance EMMI, HIC for FAIR, GSI and HGS-HIRe

HK 46.16 Do 16:00 HZ Poster

Two-phonon $E1$ excitations in ^{40}Ca and ^{140}Ce — •Martin Baldenhofer[1], Vera Derya[1], Janis Endres[1], Andreas Hennig[1], Bastian Löher[2,3], Deniz Savran[2,3], Werner Tornow[4], and Andreas Zilges[1] — [1]Institute for Nuclear Physics, University of Cologne — [2]ExtreMe Matter Institute EMMI and Research Division, GSI, Darmstadt — [3]Frankfurt Institute for Advanced Studies FIAS, Frankfurt — [4]Department of Physics, Duke University, USA

The coupling of a quadrupole- and an octupole-vibrational excitation results in a quintuplet of $J^\pi = 1^-$ to 5^- vibrational states with two-phonon structure. Candidates for harmonic two-phonon excitations are found energetically in the vicinity of the sum of the constituent excitation energies. Their structure can be tested by studying their γ-decay behavior in detail. We studied candidates for two-phonon $E1$ excitations in two nuclei of different mass, namely ^{40}Ca and ^{140}Ce, with the high-efficiency γ^3 setup [1] at the High Intensity γ-ray Source facility at the Triangle Universities Nuclear Laboratory in Durham, USA. The mono-energetic γ-ray beam allows for a selective excitation of the states of interest. In combination with the γ^3 setup, on the one hand, a high efficiency for γ-ray detection is achieved by an array of HPGe and LaBr detectors, and, on the other hand, the analysis of γ-γ coincidences is possible.

Supported by the DFG (ZI 510/4-2) and the Alliance Program of the Helmholtz Association (HA216/EMMI).

[1] B. Löher *et al.*, Nucl. Instr. and Meth. A **723** (2013) 136

HK 46.17 Do 16:00 HZ Poster

Angular distribution measurements in particle-γ coincidences using SONIC&HORUS — •Julius Wilhelmy, Vera Derya, Andreas Hennig, Simon G. Pickstone, Mark Spieker, and Andreas Zilges — Institute for Nuclear Physics, University of Cologne

The combined setup SONIC&HORUS consists of the γ-ray spectrometer HORUS with 14 HPGe detectors and the recently commissioned particle spectrometer SONIC with up to 8 ΔE-E silicon detectors. This setup is used to measure the ejectile of a nuclear reaction (p, d, t, or α) in coincidence with the deexciting γ rays emitted by the recoil nucleus. By requiring a certain ejectile energy (*e.g.* the excitation of a level), a very clean γ spectrum is obtained, in which only physically related events remain. Measuring the angular correlations between the coincident ejectiles and γ-rays allows spin assignments to excited nuclear levels by comparison to theoretical particle-γ angular correlations.

An overview of the experimental setup will be given and preliminary p-γ angular correlations measured in a recent ^{92}Mo(p,p'γ) experiment will be shown.

Supported by the DFG (ZI 510/4-2).

HK 46.18 Do 16:00 HZ Poster

Relative Selbstabsorptionsmessung dipolangeregter Zustände in ^{27}Al * — •Laura Mertes, Jacob Beller, Nadia Benouaret, Haridas Pai, Norbert Pietralla, Christopher Romig, Marcus Scheck und Markus Zweidinger — Institut für Kernphysik, Technische Universität Darmstadt

Der Kern ^{27}Al wird häufig als Standard für die Kalibrierung des Photonenflusses bei Kernresonanzfluoreszenzexperimenten mit kontinuierlichen Bremsstrahlungsphotonen verwendet, weshalb eine genaue Kenntnis der Lebensdauern dipolangeregter Zustände in ^{27}Al von großer Bedeutung ist. Daher wurden mittels einer Selbstabsorptionsmessung mit Bremsstrahlungsphotonen am Darmstädter S-DALINAC die Grundzustandsübergangsbreiten und damit die Lebensdauern von angeregten Zuständen in ^{27}Al bis zu einer Energie von E_γ=7.1 MeV bestimmt. Die Selbstabsorptionsmessung wurde relativ zu dem Kalibrationsstandard ^{11}B durchgeführt. Die Messmethode und Ergebnisse werden vorgestellt und diskutiert.

* Gefördert durch die DFG im Rahmen des SFB 634

HK 46.19 Do 16:00 HZ Poster

Preparation of an experiment to directly detect the deexcitation of the ^{229m}Th nuclear isomer* — •Benedict Seiferle[1], Lars v.d. Wense[1], Peter Thirolf[1], and Mustapha Laatiaoui[2] — [1]LMU München — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH

Indirect measurements show that ^{229}Th has a transition energy of 7.6±0.5 eV to its first excited state, which corresponds to an UV transition wavelength of 163±11 nm [1]. The experiment under developement aims to detect and measure this wavelength [2]. For this purpose a ^{233}U source is placed in a buffer gas cell, where a continuous beam is produced out of the recoil ions. By using a quadrupole mass spectrometer the ^{229}Th ions are separated from other short-lived decay products of the ^{233}U decay chain and are then collected on a micro electrode (50μm in diameter). The deexcitation of these ^{229m}Th ions will then be detected by a VUV-optical setup, containing two customized annular parabolic VUV mirrors and a phosphorus screen behind an MCP detector, watched by a CCD camera. The mirrors, as well as the collection surface, are placed in vacuum and have to be motorized, to allow for an external position control. The main focus of the poster lies on the UV system with its motorization and alignment.

[1] B.R. Beck et al., (2007), PRL 98, 142501.
[2] L.v.d. Wense et al., (2013), JINST 8 P03005.

* Supported by the DFG Grant number TH956/3-1

HK 46.20 Do 16:00 HZ Poster

Study of Dipole Responses in ^{120}Sn by (p,p') Measurement at zero-degrees — •Anna Maria Krumbholz[1], Peter von Neumann-Cosel[1], Atsushi Tamii[2], and Vladimir Yu. Ponomarev[1] for the E316-Collaboration — [1]TU Darmstadt — [2]RCNP, Osaka

A consistent and powerful method to measure electric and magnetic dipole modes over a broad excitation energy range including energies below and above the neutron separation energy is polarized proton scattering at small scattering angles including 0° [1]. A topic of high current interest is the question whether (γ,γ') data provide the correct strength of the pygmy dipole resonance (PDR) since the extraction of B(E1) strength depends on the unobserved branching ratios to excited states. Furthermore, parts of the strength may be missed because of the limits of energy resolution and detection sensitivity. Spectroscopy of the PDR provides important insight into a possible interpretation of the mode as a neutron skin oscillation. Measurements of ^{120}Sn(p,p') reaction have been performed at RCNP with a beam energy of 295 MeV and an energy resolution of about 25 keV. For the separation of electric and magnetic contributions two different independent methods are applied, viz. a multipole decomposition of the angular distributions of the cross sections based on DWBA calculations and a model-independent analysis based on polarization transfer coefficients. Results of the analysis will be presented and compared to a ^{120}Sn(γ, γ') experiment [2].

[1] A. Tamii et al., Phys. Rev. Lett. 107, 062502 (2011).
[2] B. Özel, Ph.D. thesis, Çukurova University, Adana, Turkey (2008).
*Supported by DFG under contracts SFB 634 and NE 679/3-1.

HK 46.21 Do 16:00 HZ Poster

Effizienzkalibrierung am hochauflösenden Energieverlustspektrometer am S-DALINAC mit Hilfe einer ^{90}Sr-Quelle * — •Michaela Hilcker, Norbert Pietralla, Peter von Neumann-Cosel, Andreas Krugmann, Simela Aslanidou und Gerhart Steinhilber — Institut für Kernphysik, TU Darmstadt

Die relative Effizienz der Siliziumstreifenzähler des Detektorsystems des Lintott-Spektrometers [1] am Institut für Kernphysik der TU Darmstadt wurde überprüft. Dazu wurden bei verschiedenen Magnetfeldeinstellungen Beta-Spektren einer ^{90}Sr-Quelle aufgenommen, die sich in der Streukammer befand, um das Verhalten der einzelnen

Kanäle zu vergleichen. Abweichungen zu theoretischen Vorhersagen basierend auf Fermis goldener Regel werden diskutiert. Mittels elastischer Elektronenstreuung bei einer Einschussenergie von 75 MeV an ^{150}Nd wurde während einer Elektronenstreu-Messkampagne im Herbst 2013 auch eine Messung zur absoluten Effizienz der Siliziumstreifen gemacht.

[1] A. Lenhardt, Dissertation D17, TU Darmstadt (2005).

* Gefördert von der DFG durch den SFB 634.

HK 46.22 Do 16:00 HZ Poster

Vergleich von Photoabsorptionsquerschnitten in relativistischer Protonenstreuung mit elektromagntischen Proben* — •Sergej Bassauer, Dirk Martin und Peter von Neumann-Cosel — Institutut für Kernphysik, TU Darmstadt

Durch den Vergleich aus der Coulombanregung extrahierter Photoabsorptionsquerschnitte in relativistischer Protonenstreuung mit elektromagnetischen Proben können Rückschlüsse auf den Untergrund durch nukleare Prozesse gezogen werden. Hierfür stehen Protonenstreudaten für die Kerne ^{28}Si, ^{40}Ca, ^{48}Ca, ^{96}Mo, ^{120}Sn, ^{144}Sm und ^{208}Pb sowie die entsprechenden Photoabsorptionsquerschnitte zur Verfügung. Ziel ist es durch das Anwenden verschiedener Methoden (virtuelle Photonenmethode, Waveletanalyse) die nuklearen Untergrundanteile der Protonenstreuspektren zu bestimmen und nach möglichen Parametrisierungen dieser als Funktion der Anregungsenergie, des Streuwinkels und der Massenzahl des Targetkerns zu suchen. Erste Resultate für ^{40}Ca werden diskutiert.

*Gefördert durch die DFG im Rahmen des SFB 634 und NE 679/3-1

HK 46.23 Do 16:00 HZ Poster

Lifetime of the first excited 2^+ state in ^{172}Hf and ^{174}Hf — •Rosa-Belle Gerst, Simon Stegemann, Jan Jolie, Jean-Marc Régis, Matthias Rudigier, Nima Saed-Samii, and Karl Oskar Zell — Institut für Kernphysik, Universität zu Köln, Zülpicher Str. 77, 50937 Köln

Using the ^{170}Yb(α,2n) and ^{172}Yb(α,2n) reactions the lifetimes of the first excited 2^+ state in ^{172}Hf and ^{174}Hf have been measured in fast-timing experiments using the Cologne Orange-Spectrometer and 6 $LaBr_3$(Ce)-Detectors. The lifetimes were obtained analyzing e^--γ-coincidence time-spectra with the slope method. The new and more precise lifetimes correct existing, outdated lifetimes in nuclear databases. Additionally, the systematics of the B(E2,$2_1^+ \rightarrow 0_1^+$) is studied.

This work was supported by the Deutsche Forschungsgemeinschaft (JO 391/16-1).

HK 46.24 Do 16:00 HZ Poster

Neutronenhautstudien mit schweren Kernen anhand kohärenter π^0-Photoproduktion — •Maria Isabel Ferretti Bondy für die A2-Kollaboration — Kernphysik Institut - Uni Mainz

Während die Ladungsverteilung von Kernen, u.a. in Elektronstreuexperimenten, mit sehr hoher Genauigkeit bestimmt wurde, sind Informationen über die Massenverteilung experimentell schwerer zugänglich und somit weniger exakt bekannt.

Von besonderem Interesse ist eine genaue Bestimmung der Neutronen Dichteverteilung. Speziell in Kernen mit N>>Z erwartet man die Bildung einer ausgeprägten Neutronenhaut, da die überschüssigen Neutronen nach außen gedrückt werden. Die genaue experimentelle Bestimmung der Neutronenhautdicke liefert wesentliche Vorgaben für die kernphysikalische Zustandsgleichung (EOS) und erlaubt somit Schlussfolgerungen auf die Größe von Neutronensternen.

Unter Ausnutzung der Reaktion $A(\gamma,\pi^0)A$ wurde 2012 im Rahmen der A2-Kollaboration am Mainzer Mikrotron (MAMI) ein Experiment zur Bestimmung der Massenverteilung von verschiedenen Kernen (^{58}Ni,$^{116,120,124}Sn$,^{208}Pb) durchgeführt. In diesem Poster werden neben dem Detektorsystem sowohl die Analysemethode zur Extraktion der Neutronenhautdicke, als auch erste Ergebnisse für ^{208}Pb präsentiert.

HK 46.25 Do 16:00 HZ Poster

Ion bunch stacking in a Penning trap after purification in an electrostatic ion-beam trap — •M. Rosenbusch for the ISOLTRAP-Collaboration — Ernst-Moritz-Arndt-Universität Greifswald

Measurements in analytical mass spectrometry as well as in precision mass determinations for atomic and nuclear physics are often handicapped when the ion sources deliver contaminations, i.e., unwanted ions of masses similar to those of the ions of interest. In particular, in ion-trapping devices, large amounts of contaminant ions result in significant systematic errors. At the Penning-trap mass spectrometer ISOLTRAP (ISOLDE/CERN), ions are purified in a multi-reflection time-of-flight mass separator (MR-ToF MS), which reaches a mass resolving power in excess of 10^5 in only tens of milliseconds [1,2]. However, the subsequent Penning-trap mass measurements require durations in order of a second. If only a certain maximum amount of ions can be processed simultaneously and the major parts are contaminants, the number of purified ions per mass-measurement cycle is limited. An improvement for such situations has been developed and realized recently [3]. The fast separation procedure of the MR-ToF MS is repeated several times while the purified ions are accumulated in a preparation Penning trap. In this contribution the method is described and proof-of-principle measurements are presented. [1] R. N. Wolf *et al.*, Nucl. Instrum. Meth. A 686, 82 (2012); [2] R. N. Wolf *et al.*, Int. J. Mass Spectrom. 349-350, 123 (2013); [3] M. Rosenbusch *et al.*, Appl. Phys. B, accepted (2013), http://dx.doi.org/10.1007/s00340-013-5702-0

HK 46.26 Do 16:00 HZ Poster

Untersuchung von einsetzender Deformation und Formkoexistenz in ^{46}Ar durch (t,p) Reaktion in inverser Kinematik — •Katharina Nowak für die IS499-Kollaboration — E12, Technische Universität München, Garching

Diverse Experimente und theoretische Rechnungen deuten auf ein kontinuierliches Aufweichen des klassischen N=28 Neutronen-Schalenabschlusses bei sinkender Protonenzahl hin. Nur zwei Protonen unterhalb von ^{48}Ca, zeigt auch ^{46}Ar Anzeichen für einsetzende Deformation und Formkoexistenz. Die ideale Methode um dies genauer zu untersuchen ist das 2-Neutronentransfer Experiment t(^{44}Ar,p)^{46}Ar in inverser Kinematik, welches an REX-ISOLDE mithilfe des MINIBALL Spektrometers und dem positionssensitiven Si-Detektorarray T-REX durchgeführt wurde. Erste Winkelverteilungen der Protonen werden gezeigt und mit DWBA Rechnungen verglichen.

Im Hinblick auf HIE-ISOLDE mit hohen Strahlenergien von 5.5 - 10 MeV/Nukleon ist eine Unterscheidung zwischen Transfer- und Fusionsevents nötig. Um dies zu ermöglichen wurde ein Fusionsveto entwickelt. Dieses wird vorgestellt und erste Testdaten erläutert. Diese Arbeit wurde durch BMBF (06MT9156), DFG (EXC153) und ENSAR unterstützt.

HK 46.27 Do 16:00 HZ Poster

Velocity distribution in Recoil-Distance Doppler-Shift experiments — •Thomas Braunroth, Matthias Hackstein, Alfred Dewald, Claus Müller-Gatermann, Christoph Fransen, and Dorothea Wölk — Institut für Kernphysik, Universität zu Köln, Germany

The Recoil-Distance Doppler-Shift (RDDS) technique is a well established method to measure lifetimes of excited nuclear states in the picosecond range. In standard RDDS experiments at non-relativistc beam-energies, the velocities of the emerging recoils are usually distributed narrowly around a mean velocity $\overline{v} = \langle v \rangle_v$. Under these circumstances, the effect of the velocity distribution is neglectable and the assumption that all nuclei move with the average velocity is justified. In this poster we investigate the influence of broader velocity distributions on lifetimes determined using the standard lifetime analysis-method DDCM. This can be observed, e.g., in experiments with thick targets. In particular, it is shown that the effect of the velocity distribution on the deduced lifetime is minimised at the maximum amplitude of the derivative of the decay function.

This work was partly supported by the BMBF (Germany) under Contract no. 05P12PKFNE.

HK 46.28 Do 16:00 HZ Poster

Messung der Resonanzen der Kernreaktion $^{19}F(p,\alpha\gamma)^{16}O$ bei Protonenenergien von 0,3 bis 1 MeV — •Daniel Brenner[1], Hans-Eberhard Zschau[2], Sven Neve[1] und Lothar Schmidt[1] — [1]Institut für Kernphysik, Frankfurt a.M., Deutschland — [2]Dechema-Forschungsinstitut, Frankfurt a.M., Deutschland

Obwohl die Resonanzen der Kernreaktion $^{19}F(p,\alpha\gamma)^{16}O$ vielseitig für quantitative Analysen und zur Fluor-Tiefenprofilierung genutzt wird, gibt es wenige Messungen zu Wirkungsquerschnitten und Halbwertsbreiten der einzelnen Resonanzen. Gemessene Anregungskurven sind selten und haben meist eine hohe Schrittweite der Protonenenergie.

In dieser Arbeit wurde die Anregungskurve für Protonenenergien von 0,3 bis 1 MeV mit einer Schrittweite von 500 eV gemessen. Als Target diente ein Titan-Aluminium-Träger mit einer dünnen Fluor-

schicht an der Oberfläche. Die Anregungskurve wurde in einen Anteil des Trägermaterials und einen resonanten und einen nicht resonanten Anteil der Fluor-Kernreaktion getrennt. Die Wirkungsquerschnitte, Halbwertsbreiten und Anteile der drei γ-Emissionen wurden für die jeweiligen Resonanzen bestimmt.

HK 46.29 Do 16:00 HZ Poster

Datenaufnahme mit einer Trapezfilter-basierten Datenaufnahme bei Ereignisraten bis hin zu 100 kHz — •Stefan Schmidt[1], Jan Glorius[1], Gabriele Hampel[2], Tanja Heftrich[1], René Reifarth[1], Zuzana Slavkovská[1], Kerstin Sonnabend[1], Christian Stieghorst[2], Norbert Wiehl[2] und Stephan Zauner[2] — [1]Goethe Universität, Frankfurt am Main — [2]Johannes Gutenberg Universität, Mainz

In klassischen analogen Datenaufnahmesystemen müssen zum Teil mehrere elektronische Module hintereinandergeschaltet werden, um eine einzelne Informationen zu messen. Moderne digitale Datenaufnahmesysteme hingegen ermöglichen neben der eigentlichen Digitalisierung des Messsignals auch eine Signalverarbeitung in einem einzelnen Modul. Die Signalhöhe, die häufig eine Energieinformation enthält, kann dabei durch einen Trapezfilter bestimmt werden.

Da sich nicht jeder der Parameter eines solchen Trapezfilters mit Größen einer analogen Datenaufnahme identifizieren lässt, sind Erfahrungswerte mit analogen Systemen nicht direkt auf digitale Systeme übertragbar. Vor diesem Hintergrund wurden im Mai 2012 Untersuchungen zum Verhalten einer Trapezfilter-basierten digitalen Datenaufnahme bei Ereignisraten von bis zu 100 kHz durchgeführt. Dabei wurde ein CAEN V1724 mit einem HPGe-Detektor verbunden, mit dem ^{24}Na-Proben unterschiedlicher Aktivität vermessen wurden.

Dieses Projekt wird gefördert durch den GIF Research Grant No. G -1051-103.7/2009, der Helmholtz Nachwuchsgruppe VH-NG-327 und dem Nuclear Astrophysics Virtual Institute (NAVI).

HK 46.30 Do 16:00 HZ Poster

Production of ^{85}Kr — Stefan Fiebiger[1], •Zuzana Slavkovská[1], Ulrich Giesen[2], Michael Heil[3], Ralf Plag[1,3], René Reifarth[1], Kerstin Sonnabend[1], and Benedikt Thomas[1] — [1]Goethe Universität Frankfurt — [2]Physikalisch-Technische Bundesanstalt, Braunschweig — [3]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

Neutron capture and β^--decay are competing branches of the s-process nucleosynthesis path at ^{85}Kr, which makes it an important branching point. The knowledge of its neutron capture cross section is therefore an essential tool to constrain stellar models of nucleosynthesis.
A ^{85}Kr sample can be produced via the irradiation of a stable, metallic ^{82}Se sample with α-beam. The gas stays trapped inside selenium as long as the temperature remains below 50°C. Fulfilling this temperature limit during the irradiation is one of the main technical difficulties during the production of ^{85}Kr.
Since the corresponding production cross sections are not known well enough, an experiment was performed at the PTB in Braunschweig, Germany. Various α-induced reactions on natural selenium were studied via the activation technique and the preliminary results are presented.
This project is supported by the ERC-consolidator project NAUTILUS.

HK 46.31 Do 16:00 HZ Poster

Charakterisierung einer LaBr3(Ce) Anordnung — •Matthias Fix[1], Jan Glorius[1], Kathrin Göbel[1], Arnd Junghans[2], René Reifarth[1], Stefan Schmidt[1] und Kerstin Sonnabend[1] — [1]Goethe Universität Frankfurt — [2]Helmholtz Zentrum Dresden Rossendorf

Differentielle Neutroneneinfangquerschnitte werden oft bestimmt, indem die prompte gamma-Emission zum Nachweis der stattgefundenen Reaktion genutzt wird. Für eine kalorimetrische Messung sind Detektorsysteme geeignet, die die Probe in einer 4pi Anordnung umgeben und hohe Effizienz aufweisen. Im Bereich der neutroneninduzierten Reaktionen wurde dafür bisher meist BaF2 als Szintillatormaterial benutzt. Die seit einigen Jahren verfügbaren Szintillatoren auf der Basis von Lanthanverbindungen zeichnen sich durch eine wesentlich verbesserte Energieauflösung aus. Um die Eignung von LaBr3(Ce) für solch einen Aufbau zu testen, wurde eine Anordnung von 2 Detektoren untersucht und die experimentellen Daten mit Simulationen verglichen. Dabei wurde besonderes Augenmerk auf Energie- und Zeitauflösung sowie die Effizienz gelegt. Zum Einsatz kamen verschiedene gamma-Emitter 22Na, 137Cs, 54Mn, 60Co sowie eine AmBe-Quelle.

HK 46.32 Do 16:00 HZ Poster

Auswahl von Backing-Materialien für hochleistungsbeständige Proben an FRANZ* — Markus Reich, Philipp Erbacher, Jan Glorius, Alexander Koloczek, René Reifarth, Stefan Schmidt, Kerstin Sonnabend und •Benedikt Thomas — Goethe Universität Frankfurt

An der Frankfurt Neutronenquelle FRANZ werden Experimente mit hochintensiven Protonenstrahlen geplant. Dabei werden Leistungsdepositionen von 4 kW, hauptsächlich im Backing-Material des Targets, erwartet. Die entstehende Wärme soll durch eine effiziente Wasserkühlung abgeführt werden. Für die Messungen der Wirkungsquerschnitte der Reaktionen ^{90}Zr(p,γ) und ^{91}Nb(p,γ) wurden verschiedene Backing-Materialien ausgewählt und die Temperaturentwicklung innerhalb der Targets mithilfe von Simulationen untersucht. Zur Optimierung der Kühlung wurden verschiedene Kühlgeometrien entwickelt und die Temperaturentwicklung für verschiedene Strahldurchmesser bei gleichen Randbedingungen simuliert. Mit Sicht auf den durch Reaktionen im Backing-Material produzierten Untergrund wird Wolfram als Backing-Material für die ^{91}Nb-Probe vorgeschlagen. Für die ^{90}Zr-Probe eignet sich Gold als Backing-Material. Beide Backing-Materialien wurden in den Temperatursimulationen für alle Geometrien untersucht.
* gefördert durch DFG(SO907/2-1)

HK 46.33 Do 16:00 HZ Poster

Friedmann-Kosmologie mit Dunkler Materie und Dunkler Energie — •Robin Lautenbacher und Horst Lenske — Institut für Theoretische Physik, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 16, D-35392 Giessen

Die Zustandsgleichungen von Friedmann-Universen werden für verschiedene Szenarien untersucht. Im Mittelpunkt stehen erweiterte Modelle, die neben der üblichen zeitunabhängigen auch zeitabhängige Dichte-Druck Relation zulassen. Ergebnisse für materie- und strahlungsdominierte Universen werden präsentiert und der Bezug zum Hubble-Parameter herausgearbeitet. In einem erweiterten Modell werden Beiträge von Dunkler Materie und Dunkler Energie betrachtet. Beiträge zur Energiedichte werden zunächst wechselwirkungsfrei untersucht mithilfe einer inhomogenen Zustandsgleichung für Dunkle Energie, die als Vakuumenergie angesetzt wird. Abschließend werden Wechselwirkungen zwischen Dunkler Materie und Vakuumenergie mit homogenen Zustandsgleichungen betrachtet.

HK 46.34 Do 16:00 HZ Poster

Field mapping of the KATRIN Pinch Magnet — •Axel Müller for the KATRIN-Collaboration — Karlsruhe Institute of Technology, IEKP

The **Ka**rlsruhe **Tri**tium **N**eutrino experiment aims to probe the effective mass of the electron antineutrino in a model-independent way with an unsurpassed sensitivity of 200 meV/c^2 (90% C.L.). The energy spectrum of the electrons from Tritium β-decay is analyzed by an electrostatic spectrometer which is based on the MAC-E filter principle. The so-called PINCH magnet - a superconducting solenoid located at the end of the spectrometer - is a crucial part of the MAC-E filter and its field strength of 6 T is directly related to the sensitivity of the experiment. Thus, a clear understanding of its field stability and field map is indispensable for the success of KATRIN.
Along with an overview of the KATRIN experiment and the MAC-E filter principle this poster will present the results of a detailed study of the PINCH magnet's field map obtained with a 3-axis hall probe.
This work is supported by the BMBF (05A11VK3) and the Helmholtz association.

HK 46.35 Do 16:00 HZ Poster

The Focal-Plane Detector System of the KATRIN Experiment — •Frank Bandenburg for the KATRIN-Collaboration — Karlsruhe Institute of Technology, IEKP

The **Ka**rlsruhe **Tri**tium **N**eutrino experiment aims to probe the effective mass of the electron antineutrino in a model-independent way with an unsurpassed sensitivity of 200 meV/c^2 (90% C.L.). The task of the Focal-Plane Detector System is to detect the electrons from the Tritium β-decay which were transmitted through an electrostatic spectrometer based on the MAC-E filter principle. Thereby, a high detection efficiency has to be maintained while keeping the detector nearly background free. The detector system consists of two superconducting solenoids, a post-acceleration electrode, as well as several calibration sources. The detector itself is a Si-PIN diode wafer of 90 mm diameter

with 148 segments and low-noise amplification electronics.
Besides an overview of the Focal-Plane Detector system this poster will focus on its performance parameters. This includes its intrinsic background level as well as its energy resolution and detection efficiency.
This work is supported by the BMBF (05A11VK3) and the Helmholtz association.

HK 46.36 Do 16:00 HZ Poster

Life time of the HFS transition in Li-like $^{209}Bi^{80+}$ — Ch. Geppert[2,3], V. Hannen[1], R. Jöhren[1], Th. Kühl[2,3,4], W. Nörtershäuser[2,3], H.-W. Ortjohann[1], R. S'anchez[3], Th. Stöhlker[2,3,4,5], •J. Vollbrecht[1], Ch. Weinheimer[1], and D. Winters[3] — [1]Institut für Kernphysik, Uni Münster — [2]Institut für Kernchemie, Uni Mainz — [3]GSI, Darmstadt — [4]Helmholtz Institut Jena — [5]Uni Jena

Measuring the hyperfine splitting of heavy, highly charged ions enables tests of QED in strong fields. HFS calculations have a relative uncertainty of more than 10^{-3} due to the distribution of the magnetic moment (Bohr-Weisskopf-Effekt). With an appropriate comparison of H- and Li-like ions this nuclear structure contribution can be suppressed. Bismuth is a suitable element for these studies, as the HFS splitting for both configurations are in a wavelength range suitable for laser spectroscopy. For this purpose the two ion species were stored in the Experimental Storage Ring at GSI at a velocity of $\beta = 0.71$. To efficiently collect the forward emitted photons a specially developed movable detector system was used. Thereby the HFS of Li-like $^{209}Bi^{80+}$ was successfully measured for the first time. Besides the determination of the transition energy it was possible to extract the life time of the transition out of the collected data. The corresponding analysis and the results are presented on this poster.
This work is supported by BMBF under contract number 05P12PMFAE.

HK 46.37 Do 16:00 HZ Poster

Study of magnetic field design for the neutron lifetime project: tau-SPECT — Marcus Beck[1], •Simo Dragisic[1], Klaus Eberhardt[2], Werner Heil[1], Jan Karch[1], Fabian Kories[1], Yury Sobolev[1,2], Dietmar Stepanow[1], and Norbert Trautmann[2] — [1]Institut für Physik Universität Mainz , Mainz, Deutschland — [2]Institut für Kernchemie Universität Mainz, Mainz, Deutschland

Magnetic storage of ultracold neutrons (UCN) is a new approach to measure the lifetime of the free neutron. At Mainz we plan to upgrade the existing superconducting aSPECT spectrometer [1] by implementing a magnetic multipole made out of permanent magnets . This measure will provide the radial storage of UCN whereas the aSPECT magnet itself confines the UCN ("low field seakers") along its longitudinal axis. In the meantime, extensive magnetic field calculations have been done using Comsol multiphysics which gave us the optimum arrangement of multipole magnets. The poster informs about the requirements on the design of the Halbach multipole magnet, the resulting magnetic field strength and the geometric constraints within the cold bore tube of the aSPECT magnet.

HK 46.38 Do 16:00 HZ Poster

Towards reaction cross section measurements of β^+ emitters produced in hadron therapy — •Björn Tegetmeyer[1], Saad Aldawood[1,2], Hugh van der Kolff[1,3], Christian Lang[1], Katia Parodi[1], and Peter Thirolf[1] — [1]LMU, Munich, Germany — [2]TU Delft, Netherlands — [3]King Saud University, Riyadh, Saudi Arabia

Therapeutic proton (or carbon) beams hitting human tissue induce nuclear reactions, eventually producing β^+-emitting reaction products ($^{10,11}C$,$^{14,15}O$,^{13}N). Those can be used for an ion-beam range verification via positron emission tomography (PET). In order to allow for a precise treatment planning in hadron therapy, the most relevant nuclear cross sections need to be included with sufficient precision into the phenomenological hadron interaction modes of the Monte-Carlo simulation. However, many of these cross sections are not known to the desired accuracy. Thus, we started to develop the methodology to measure proton-induced reaction cross sections of medically relevant β^+-emitters, starting with $^{16}O(p,\alpha)^{13}N$ at the Garching Tandem accelerator ($E_p = 7 - 20$ MeV). The experimental setup, procedure and status of the project will be displayed.

HK 46.39 Do 16:00 HZ Poster

Bestimmung der Nachweisgrenze bei der Tiefenprofilierung von Fluor in TiAl mittels PIGE — •Daniel Brenner[1], Hans-Eberhard Zschau[2], Sven Neve[1] und Lothar Schmidt[1] — [1]Institut für Kernphysik, Frankfurt a.M., Deutschland — [2]Dechema-Forschungsinstitut, Frankfurt a.M., Deutschland

Die Modifizierung der Oberflächen von Titan-Aluminium-Legierungen mit Fluor verbessert die Oxidationsbeständigkeit bei hohen Temperaturen. Bei einem neuen Verfahren des Recyclings des Werkstoffs werden geringe Mengen CaF_2 zugesetzt. Auch dies könnte zu einem erfolgreichen Oxidationsschutz führen.

Um einen erfolgreichen Halogeneffekt für geringe Konzentrationen von Fluor nachweisen oder widerlegen zu können, muss Fluor auch im ppm-Bereich zerstörungsfrei nachgewiesen werden können. Dazu wurden $TiAl$-Proben mit geringen Mengen Fluor oberflächennah implantiert. Durch Mehrfachimplantationen kann ein Bereich annähernd konstanter Fluor-Konzentration realisiert werden. Die Technik der Proton Induced Gamma Emission (PIGE) diente zum Nachweis der implantierten Profile. Die Nachweisgrenze unter den Bedingungen der zerstörungsfreien Tiefenprofilierung des bisher üblichen Messsystems mit NaI-Detektor und VKA wurde auf 400 ppm bestimmt und nach Umstieg auf digitale Datenaufnahme weiter verbessert. Es wurden sowohl mit Fluor implantierte $TiAl$-Proben, als auch Proben aus recyceltem $TiAl$ untersucht.

HK 46.40 Do 16:00 HZ Poster

Bunching High Intensity Proton Beams with a CH-DTL — •Malte Schwarz, Christine Claessens, Manuel Heilmann, Ole Hinrichs, Daniel Koser, Oliver Meusel, Daniel Noll, Holger Podlech, Ulrich Ratzinger, and Anja Seibel — Institut für Angewandte Physik, Goethe-Universität Frankfurt am Main, Germany

The Frankfurt Neutron Source at the Stern-Gerlach-Zentrum (FRANZ) will provide ultra short neutron pulses at high intensities and repetition rates. The facility is under construction with an expected first beam by the end of 2014. A 5-Gap CH rebuncher is installed behind a coupled RFQ/IH-DTL combination at the end of the LINAC section between two magnetic quadrupole triplets. It will be used for varying the final energy between 1.8 and 2.2 MeV, as well as for focusing the proton beam bunch longitudinally, to compensate RF defocusing effects and huge space charge forces at currents up to 200 mA at the final stage of extension.

Therefore high current beam dynamic simulations are in progress. They include benchmarking of different beam dynamic codes like LORASR, TraceWin and Bender (a new PIC tracking code developed at IAP), as well as validating the results by measurements. Detailed error tolerance studies, thermal simulations and examination of multipole field impact, due to the cavity geometry, are also done.

Furthermore, this CH rebuncher serves as prototype for CH cavity operation at MYRRHA (Belgium), an Accelerator Driven System (ADS) for transmutation of high level nuclear waste. After copperplating the cavity, RF conditioning will start in spring 2014.

HK 46.41 Do 16:00 HZ Poster

The Fast Piezo-Based Frequency Tuner for sc CH-Cavities — •Michael Amberg[1,2], Kurt Aulenbacher[1], Winfried Barth[1], Marco Busch[2], Florian Dziuba[2], Holger Podlech[2], and Ulrich Ratzinger[2] — [1]Helmholtz-Institute Mainz (HIM), Mainz, Germany — [2]IAP University of Frankfurt, Frankfurt am Main, Germany

Superconducting (sc) structures have to fulfill strict mechanical requirements to assure a stable operation of a cavity. Even small mechanical disturbances caused by effects like microphonic noise, pressure fluctuations of the liquid helium bath or Lorentz force detuning can change the resonance frequency of the cavity in the range of several hundred kHz. To control the slow and fast frequency variations during operation a compact frequency tuner prototype equipped with a stepper motor and a piezo actuator has been developed at the Institute for Applied Physics (IAP) of Frankfurt University. The tuner design and the results of first mechanical tests at room temperature of the first prototype are presented.

HK 46.42 Do 16:00 HZ Poster

Cold Tests of a sc 325 MHz CH-Cavity — •Marco Busch[1], Florian Dziuba[1], Holger Podlech[1], Ulrich Ratzinger[1], and Michael Amberg[2,1] — [1]IAP University of Frankfurt, Frankfurt am Main, Germany — [2]Helmholtz-Institute Mainz (HIM), Mainz, Germany

At the Institute for Applied Physics (IAP), University of Frankfurt, a superconducting 325 MHz CH-Cavity has been designed, built and first tests at 4 K have been performed. The cavity is determined for beam tests with a 11.4 AMeV, 10 mA ion beam at the GSI UNILAC. It consists of 7 gaps and is a candidate to deliver a gradient of at least

5 MV/m yielding voltages of 2.5 MV and above. New properties of this compact structure comprise low electric peak fields, improved surface processing capabilities and power coupling. Furthermore dynamic bellow tuners are welded into the resonator controlling the frequency after cool-down and during operation. In this contribution first measurement results accomplished at 4 K at the cryo lab in Frankfurt will be presented.

HK 46.43 Do 16:00 HZ Poster

Systematische Vermessung der Pumpeigenschaften kryogener Oberflächen — •Frederic Chill[1,2], Oliver Kester[1,2], Peter Spiller[2] und Lars Bozyk[2] — [1]Institut für Angewandte Physik, Frankfurt — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

Die Qualität des Strahlvakuums ist entscheidend für den stabilen Betrieb von Schwerionen-Synchrotrons mit höchster Intensität. Kryogene Oberflächen sind in der Lage, Restgas bis zu einem von den Dampfdruckkurven vorgegebenen Druck durch *Kryokondensation* zu binden. Bei geringer Oberflächenbedeckung kann Restgas auch durch *Kryosorption* gebunden werden. Dies erlaubt es, Wasserstoff ab dem Unterschreiten von 18K zu einem deutlich tieferen Endruck zu pumpen, als die Dampfdruckkurve angibt.

Die Pumpeigenschaften kryogener Oberflächen lassen sich mittels zweier Parameter beschreiben: Dem *Stickingparameter*, der beschreibt, mit welcher Wahrscheinlichkeit ein Restgasteilchen an der Wand haften bleibt und der *mittleren Verweildauer* der Teilchen an der Wand. Beide Parameter hängen von der Oberflächentemperatur und -bedeckung ab.

Zur Bestimmung dieser Größen wird derzeit ein Experiment mit einer kaltkopfgekühlten Kammer aufgebaut. Es erlaubt die Messung des Saugvermögens und des Gleichgewichtsdrucks der kalten Oberflächen. Daraus lassen sich dann die gesuchten Parameter ermitteln. Mit den Ergebnissen kann die Voraussagegenauigkeit des bei GSI entwickelten Simulationsprogramms für das dynamische Vakuum in kalten Beschleunigerabschnitten weiter verbessert werden.

HK 46.44 Do 16:00 HZ Poster

Test of a non-invasive Bunch Shape Monitor at the GSI high current LINAC — •Benjamin Zwicker[1,2], Christoph Dorn[1], Peter Forck[1,2], Oliver Kester[1,2], and Piotr Kowina[1] — [1]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — [2]Institut für Angewandte Physik, Goethe Universität Frankfurt, Germany

At the heavy ion LINAC at GSI, a novel scheme of non-invasive Bunch Shape Monitor has been tested with several ion beams at 11.4 MeV/u. Caused by the beam impact on the residual gas, secondary electrons are liberated. These electrons are accelerated by an electrostatic field, transported through a sophisticated electrostatic energy analyzer and an rf-deflector, acting as a time-to-space converter. Finally a MCP detects the electron distribution. For the applied beam settings this Bunch Shape Monitor is able to obtain longitudinal profiles down to 400 ps with a resolution of 50 ps, corresponding to 2 degree of the 36 MHz acceleration frequency. During a long shutdown period for the GSI accelerators in 2013, the monitor underwent a general technical retrofit: Influence of the beam has been significantly reduced, due enhanced electrodes, new apertures have been installed to decrease electron scattering, sophisticated stepping motors will allow better image properties, a MCP shielding plate will prevent high background.

Together with these improvements the achievements of the monitor are discussed.

HK 46.45 Do 16:00 HZ Poster

Buncher-Cavities for the MYRRHA Injector LINAC — •Daniel Koser, Markus Basten, Dominik Mäder, Daniel Noll, Holger Podlech, Ulrich Ratzinger, Malte Schwarz, Anja Seibel, and Markus Vossberg — Institute for Applied Physics IAP, Frankfurt am Main, Germany

MYRRHA (Multi-purpose hYbrid Research Reactor for High-tech Applications) is currently being designed as an Accelerator Driven System (ADS) for demonstrating the feasibility of transmutation of high level nuclear waste. The MAX project (MYRRHA Accelerator eXperiment and development) is the corresponding R&D programme for the designated proton driver, which should provide the spallation target with a continuous wave proton beam of 600 MeV and 4 mA.

The current layout of the injector design includes a 2-gap as well as a 5-gap room temperature rebunching structure operating at 176,1 MHz with total effective voltages of 116 kV and 270 kV, respectively, which both are being designed at IAP. For maximum power efficiency the 2-gap structure is going to be implemented as a quarter-wave coaxial resonator whereas the 5-gap structure will be a CH cavity, for which a prototype was already built within the scope of FRANZ.

In order to optimize the performance and to provide a reliable cooling system and mechanical stability, RF, thermal and structural mechanics simulations are done mainly using CST Studio. Also the beam dynamics is going to be investigated using a new particle in cell tracking code called BENDER, which was developed at IAP.

HK 46.46 Do 16:00 HZ Poster

Design of a 325 MHz Ladder - Type RFQ for FAIR — •Maximilian Schütt, Robert Brodhage, Ali Almomani, and Ulrich Ratzinger — Institut für Angewandte Physik, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

For the research program with cooled antiprotons at FAIR a dedicated 70 MeV, 70 mA proton injector is required. The first rf accelerator element is a 325 MHz RFQ accelerating from 95 keV to 3.0 MeV. RFQ's beyond 300 MHz were realized in 4-Vane-type geometry so far. At IAP there is a tradition in 4-Rod-type RFQ development. This RFQ-type is dominating at lower frequencies. Very promising results have been reached with a ladder type-RFQ, which has been investigated during 2013. We will show most recent 3D simulations of the general layout and of a whole cavity demonstrating the power of a ladder type RFQ. An RFQ layout for the new FAIR proton injector will be presented. In comparison with a traditional 4-Rod RFQ approach the geometry is more convenient at high frequencies.

HK 46.47 Do 16:00 HZ Poster

High Gradient Room Temperature Cavity Development for 10-100 AMeV Beams — •Ali Almomani and Ulrich Ratzinger — Institut für Angewandte Physik - Frankfurt Universität, Frankfurt am Main, Germany

The linac activities are aimed on compact designs and to increase the voltage gain per meter. At IAP - Frankfurt, a CH design was developed for these studies, where the mean effective accelerating field is expected to reach well above 10 MV/m at 325 MHz, β=0.164. Within a funded project (BMBF No. 05P12RFRB9), this cavity is systematically developed. The results should give an impact on the rebuilt of the UNILAC - Alvarez section, optimized for achieving the beam intensities specified for the GSI - FAIR project. The availability of the GSI 3 MW klystron test stand will be very important for these investigations. The status of the cavity design will be presented.

HK 46.48 Do 16:00 HZ Poster

Experimental Results of an ExB Chopper System — •Christoph Wiesner, Hannes Dinter, Martin Droba, Oliver Meusel, Daniel Noll, Tobias Nowottnick, Onur Payir, Ulrich Ratzinger, and Philipp Schneider — IAP, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

A new chopper system for low-energy high-perveance beams and high repetition rates was developed for the Low Energy Beam Transport (LEBT) section of the accelerator-driven neutron source FRANZ [1]. The chopper combines a static magnetic deflection field with a pulsed electric compensation field in a Wien filter-type ExB configuration [2]. The total system length is 80 cm.

Successful beam operation of the chopper has started. Helium beams with 14 keV energy were chopped with the required repetition rate of 257 kHz. The beam pulses have rise times of 120 ns and Full Width at Half Maximum (FWHM) of 240 ns to 370 ns. When the future high-current proton source of the FRANZ facility is available, the chopper will operate with a 50 mA, 120 keV beam. The design of the chopper and results of beam experiments are presented.

[1] U. Ratzinger et al., Proc. of IPAC2011, San Sebastian, Spain, WEPS040.

[2] C. Wiesner et al., Proc. of IPAC2012, New Orleans, LA., USA, THPPP074.

HK 46.49 Do 16:00 HZ Poster

Strahlseparationssystem für intensive Protonenstrahlen — •Onur Payir, Hannes Dinter, Oliver Meusel, Daniel Noll, Tobias Nowottnick, Ulrich Ratzinger, Philipp Schneider und Christoph Wiesner — IAP, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

Die beschleunigergetriebene Neutronenquelle FRANZ soll hochintensive Neutronenpulse mit einer Wiederholrate von 250 kHz erzeugen. In

der niederenergetischen Strahltransportsektion prägt ein ExB Chopper dem primären 120 keV, 50 mA Protonenstrahl die 250 kHz Zeitstruktur auf. Um dabei die durch Strahlverluste hervorgerufene thermische Belastung und die unkontrollierte Produktion von Sekundärteilchen zu minimieren, ist für die anschließende Strahlseparation ein sogenanntes masseloses Septumsystem in Planung.

Das Septumsystem besteht aus einem statischen C-Magneten und einer magnetischen Abschirmröhre mit einem Schlitz an der Seite. Der C-Magnet soll den am Chopper abgelenkten Strahl in einen Beam Dump führen. Gleichzeitig wird mit der Abschirmröhre das magnetische Feld auf der ca. 60 mm entfernten Strahlachse des transmittierten Strahls abgeschirmt. Mithilfe numerischer Simulationen wurde das Funktionsprinzip und die Strahltransporteigenschaften des Septumsystems untersucht und das Design des C-Magneten entworfen. Bei einem Hauptfeld von ca. 260 mT konnte auf der Strahlachse ein Maximalfeld von <1 mT erreicht werden, während der abgelenkte Strahl durch Modifikationen an den Polschuhplatten des C-Magneten mit minimalen Verlusten in einen Beam Dump geführt werden konnte.

HK 46.50 Do 16:00 HZ Poster

Untersuchungen des Transports niederenergetischer Strahlen durch einen Solenoidkanal — •Tobias Nowottnick, Hannes Dinter, Philipp Schneider, Christopher Wagner, Oliver Meusel, Onur Payir, Ulrich Ratzinger und Christoph Wiesner — IAP, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

In der Low Energy Beam Transport Section (LEBT) der Frankfurter Neutronenquelle FRANZ [1] werden vier Solenoide als magnetische Linsen für die transversale Fokussierung des 50 mA Protonenstrahls eingesetzt. Dabei werden die ersten beiden Solenoide für die Einpassung in den ExB-Chopper [2] verwendet, welcher dem 120 keV Strahl eine Zeitstruktur aufprägt. Die beiden anderen Solenoide werden für die Einpassung in die gekoppelte RFQ/IH-DTL Beschleunigerstruktur verwendet.

Der niederenergetische Transportkanal wurde erfolgreich in Betrieb genommen. Es werden experimentelle Untersuchungen und Strahltransportsimulationen für einen Helium-Teststrahl dargestellt. Dabei liegt der Fokus der Untersuchung auf einer maximalen Transmission und einer verlustfreien Einpassung in die Akzeptanz des Choppers.

[1] U. Ratzinger et al., Proc. of IPAC2011, San Sebastián, Spain, WEPS040.

[2] C. Wiesner et al., Proc. of IPAC2012, New Orleans, LA., USA, THPPP074.

HK 46.51 Do 16:00 HZ Poster

Entwicklung einer Gabor-Plasmalinse mit geregelter Fokussierstärke — •Stephan Klaproth, Kathrin Schulte, Oliver Meusel, Martin Droba und Ulrich Ratzinger — Institut für Angewandte Physik, Frankfurt, Deutschland

Durch das elektrische Raumladungsfeld der in der Gabor-Plasmalinse eingeschlossenen Elektronenwolke können, unter Voraussetzung einer homogenen Elektronendichteverteilung, Ionenstrahlen aberrationsfrei abgebildet werden.

Dabei sind Kenntnisse über die Eigenschaften und die Parameter, wie z.B. die Plasmadichte, die Raumladungsverteilung und die zeitliche Stabilität des Nicht-Neutralen-Plasmas wichtig. Über das angelegte Potential, das magnetische Feld und den Restgasdruck lassen sich diese Eigenschaften variieren. Um diesen 3D-Parameterraum ausmessen zu können soll ein automatisiertes Kontrollsystem entworfen werden.

Das Kontrollsystem soll dabei nicht nur in der Lage sein den 3D-Parameterraum auszumessen, sondern auch die Brechkraft der Gabor-Plasmalinse im Einsatz als Fokussierelement automatisch zu regeln.

In diesem Beitrag werden die Funktionsweise der Diagnose und das Konzept des Kontrollsystems präsentiert.

HK 46.52 Do 16:00 HZ Poster

First coupled CH Power Cavity for the FAIR Proton Injector — •Robert Brodhage[1], Wolfgang Vinzenz[1], Ali Almomani[2], and Ulrich Ratzinger[2] — [1]GSI Helmholtzzentrum für Schwerionenforschung — [2]Institut für Angewandte Physik, Uni Frankfurt

For the research program with cooled antiprotons at FAIR a dedicated 70 MeV, 70 mA proton injector is required. The main acceleration of this room temperature linac will be provided by six CH cavities operated at 325 MHz. Each cavity will be powered by a 2.5 MW Klystron. For the second acceleration unit from 11.5 MeV to 24.2 MeV a 1:2 scaled model has been built. Low level RF measurements have been performed to determine the main parameters and to prove the concept of coupled CH cavities. In 2012, the assembly and tuning of the first power prototype was finished. Until then, the cavity was tested with a preliminary aluminum drift tube structure, which was used for precise frequency and field tuning. In 2013 the final drift tube structure has been welded inside the main tanks and the preparation for copper plating has taken place. This paper will report on the main tuning and commissioning steps towards that novel type of DTL and it will show the latest results measured on a fully operational and copper plated CH proton cavity.

HK 46.53 Do 16:00 HZ Poster

Inbetriebnahme der gekoppelten RFQ-IH-Struktur für FRANZ — •Manuel Heilmann, Christine Claessens, Dominik Mäder, Oliver Meusel, Ulrich Ratzinger, Alwin Schempp und Malte Schwarz — Institut für Angewandte Physik, Goethe-Universität Frankfurt am Main, Germany

Die Frankfurter Neutronenquelle am Stern-Gerlach-Zentrum (FRANZ) liefert sehr kurze Neutronenpulse bei hohen Intensitäten und Wiederholraten. Die Neutronen werden mit 2 MeV Protonen über eine ^{7}Li(p,n)^{7}Be Reaktion erzeugt. Die gekoppelte RFQ-IH-Kombination mit einer Betriebsfrequenz von 175 MHz hat eine Gesamtlänge von 2,3 m und beschleunigt Protonen von 120 keV auf 2,03 MeV. Die Verlustleistung der gekoppelten Strukturen summiert sich auf über 200 kW. Die RFQ-IH-Kombination wird nur von einem HF-Sender betrieben und die Leistung wird induktiv in den RFQ eingekoppelt. Die IH-Struktur wird über eine induktive interne Kopplung mit angeregt. Der erste Strahlbetrieb der Beschleuniger ist ausgelegt für 50 mA. Die IH-Komponenten sind gebaut und erste HF-Messungen werden vorbereitet. Beide Beschleuniger werden separat konditioniert und danach gekoppelt. Der erste Strahlbetrieb der beiden Beschleuniger und der MEBT-Sektion wird Ende 2014 statt finden.

HK 46.54 Do 16:00 HZ Poster

Strahldynamik in der LEBT-Sektion für FRANZ — •Philipp P. Schneider, Hannes Dinter, Martin Droba, Oliver Meusel, Daniel Noll, Tobias Nowottnick, Onur Payir, Holger Podlech, Alwin Schempp und Christoph Wiesner — Institut für Angewandte Physik (IAP), Goethe-Universität, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

Die Sektion für Niederenergie-Strahltransport (Low Energy Beam Transport, LEBT) der beschleunigergetriebenen Neutronenquelle FRANZ besteht aus insgesamt vier Solenoiden. Die erste Sektion, die aus zwei Solenoiden besteht, wird einen 120 keV Protonen-Strahl in ein Chopper-System einpassen. Dem Chopper-System folgt eine Sektion mit zwei weiteren Solenoiden, die den Strahl in die Akzeptanz des anschließenden RFQs einpassen. Der Beschleuniger wird entweder mit einem kontinuierlichen 2-mA-Strahl oder einem gepulsten Strahl mit Strahlströmen von 50 mA bis 200 mA bei 250 kHz Wiederholrate betrieben. Die hohe Intensität dieser Ionenstrahlen erfordert die Berücksichtigung von Raumladungseffekten. Es wurden Teilchensimulationen mit verschiedenen Parameter-Sets durchgeführt, um die Einstellungen bester Transmission und Strahlqualität zu finden. Zudem wurden Verlustprofile entlang des Transportkanals berechnet, um Hotspots zu identifizieren. Die Simulationsergebnisse für die beste Transmission bei niedrigstem Emittanzwachstum werden präsentiert.

HK 46.55 Do 16:00 HZ Poster

The electronic readout of the $\overline{\mathrm{P}}$ANDA Straw Tube Tracker — •Stephan Leiber, James Ritman, and Peter Wintz for the PANDA-Collaboration — Forschungszentrum Jülich GmbH

The $\overline{\mathrm{P}}$ANDA experiment at FAIR will use antiproton beams with momenta between 1.5 and 15 GeV/c and proton, deuteron or nucleon targets to study $\bar{\mathrm{p}}$p-annihilations in the charm quark mass regime with $\sqrt{s} = 2.3$ - 5.5 GeV.

The central Straw Tube Tracker (STT) in the $\overline{\mathrm{P}}$ANDA-spectrometer is a gas detector consisting of 4636 closed-packed, self supporting straw tubes which are arranged in six hexagonal sectors and 23 - 27 radial layers to precisely measure the particle tracks and their specific energy loss dE/dx for particle identification. The single hit resolution is about $\sigma_{xy} = 150\,\mu$m and $\sigma_z = 2$ - 3 mm and the information of the particle identification ($\sigma_{(dE/dx)} < 10\,\%$) is needed to separate protons, pions and kaons with momenta below 1 GeV/c.

In 2013 the construction phase of the STT started. The design including the readout system will be described and results from in-beam and cosmic ray tests will be shown.

HK 46.56 Do 16:00 HZ Poster

Implementation of Pattern Recognition for the PANDA Forward Tracking System* — •Martin J. Galuska, Jifeng Hu, Wolfgang Kühn, J. Sören Lange, Yutie Liang, David Münchow, Björn Spruck, and Milan Wagner for the PANDA-Collaboration — II. Physik. Inst., JLU Gießen

The planned PANDA fixed-target experiment will operate with up to $2 \cdot 10^7$ antiproton-proton or antiproton-nucleus collisions per second. Up to 8 primary charged particles per event are expected to reach the acceptance of the PANDA Forward Tracking System (FTS) detector which is comprised of 6 stations with 4 straw tube double layers with drift times ≤ 150 ns. With $\geq 99.6\%$ probability the signals of ≤ 8 events will have to be processed simultaneously at the peak interaction rate of 20 MHz.

A Hough transform based charged particle tracking algorithm for the PANDA FTS detector was developed. In the region of the PANDA Forward Spectrometer it uses a 3-stages track model of line+parabola+line for the projection of the track into the bending x-z-plane. The projection into the non-bending y-z-plane is approximated by a straight line. Results on efficiency and momentum resolution will be presented.

* This work was supported in part by BMBF (05P12RGFPF), HGS-HIRe for FAIR and the LOEWE-Zentrum HICforFAIR.

HK 46.57 Do 16:00 HZ Poster

Cluster beam investigation with MCPs — •Esperanza Köhler, Daniel Bonaventura, Silke Grieser, Ann-Katrin Hergemöller, Alexander Täschner, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

High intensity cluster-jet beams produced in Laval nozzles represent a very attractive and extremely interesting tool for studies at storage ring experiments, such as PANDA, or for laser-induced particle acceleration. Since the cluster properties vary with increasing number of constituents, it is essential to perform systematic measurements on the target thickness and especially on the cluster masses. For this purpose a monitoring system based on Micro Channel Plates (MCPs) combined with a phosphor screen has been developed and installed at the beam dump of the PANDA prototype cluster-jet target in Münster. It could be shown that this MCP system allows for a direct observation of an ionised cluster beam. In addition, with this setup the possibility to visualise the vertex zone at the ANKE cluster-jet target at COSY was succesfully demonstrated, where a proton beam with a momentum of 2.09 GeV/c interacted with a hydrogen cluster-jet beam. Furthermore, cluster mass investigations can be performed in conjunction with a retardation field. In this presentation an overview of the MCP detection system, images of the cluster-jet beam and the vertex zone as well as the results of the current cluster mass measurements will be presented and discussed.

Supported by EU (FP7), BMBF, and GSI F+E.

HK 46.58 Do 16:00 HZ Poster

Cherenkov-Licht Nachweis und e^+e^--Identifikation im HADES RICH* — •Tobias Kunz[1], Jürgen Friese[1], Korbinian Schmidt-Sommerfeld[1] und Laura Fabietti[2] — [1]Physik Dept. E12, Technische Universität München, 85748 Garching, Deutschland — [2]Excellence Cluster "Universe", 85748 Garching

Für die e^+e^--Paarspektroskopie in Schwerionenreaktionen ist die Nachweiswahrscheinlichkeit für relativistische e^+/e^--Teilchen von zentraler Bedeutung. Im HADES Experiment an der GSI, Darmstadt, werden diese mit einem hadronblinden RICH-Detektor identifiziert, der das Cherenkovlicht mit einem photosensitiven Gasdetektor nachweist. Für ein quantitatives Verständnis der e^+e^--Nachweiswahrscheinlichkeit wird eine genaue Kenntnis des Ansprechverhaltens des Photonendetektors benötigt. Nach dem Neubau der Ausleseelektronik wurden dazu verschiedene Messungen durchgeführt. Einerseits wurden in voll rekonstruierten π^0-Dalitz-Zerfällen ($\pi^0 \rightarrow \gamma e^+e^-$) aus Au + Au Reaktionen bei E = 1.25 AGeV die gemessenen Cherenkovringe im Hinblick auf das Photonensignal untersucht. Desweiteren wurde der Detektor mit einer speziellen Lichtquelle bestrahlt, die bei einer Rate von ca. 1 kHz einzelne Photonen im VUV-Bereich emittiert. Die erhaltenen Amplituden- und Padmultiplizitätsverteilungen für einzelne Photonen dienen als Grundlage für die vollständige Simulation des Detektors. Die Ergebnisse beider Messungen werden vorgestellt.

* supp. by BMBF(06MT7180)

HK 46.59 Do 16:00 HZ Poster

A novel mass calibration mode for the MR-TOF-MS at the FRS Ion Catcher — •Jens Ebert for the FRS Ion Catcher-Collaboration — Justus-Liebig-Universität Gießen

Fission and projectile fragments, produced in an accelerator facility at relativistic energies, must be slowed down for high-precision experiments at low energies. At the FRS Ion Catcher experiment, a test bench for the low energy branch of the Super-FRS at FAIR, this has been done in July and August 2012 for an Uranium beam with 1GeV/u fragmented on a Beryllium target. The projectile fragments were separated in-flight, range-bunched, slowed-down in the Fragment Separator (FRS) at GSI and subsequently thermalized in a cryogenic stopping cell (CSC). With the ions extracted from the CSC and transported to a multiple-reflection time-of-flight mass spectrometer (MR-TOF-MS) mass measurements were performed for different isobars with A=211 and A=213 like the short lived ^{213}Rn with a half-live of only 20 ms.

The data analysis of this mass measurements including a novel calibration mode for ions with different turn numbers in the analyzer of the MR-TOF-MS will be presented. This calibration mode allows high resoluted mass measurements for ions of interest without isobaric calibration ions.

HK 46.60 Do 16:00 HZ Poster

Simulation eines 4π BaF_2-Kalorimeters mit GEANT4 * — •Emilio Mevius[1], Max Gilbert[1], Jan Glorius[1], Ralf Plag[2], Rene Reifarth[1], Stefan Schmidt[1], Kerstin Sonnabend[1], Mario Weigand[1] und Clemens Wolf[1] — [1]Institut für Angewandte Physik, Goethe Universität Frankfurt — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

Zur Untersuchung neutronen- und protoneninduzierter Reaktionen kommt an der Frankfurter Neutronenquelle FRANZ ein 4π BaF_2-Kalorimeter zum Einsatz. Es besteht aus bis zu 42 Kristallen mit fünf- oder sechseckiger Grundfläche, um eine möglichst vollständige Abdeckung des gesamten Raumwinkels zu gewährleisten. Die Geometrie des gesamten Detektorarrays wurde erstmals in GEANT4 implementiert und die Detektorantwort zu diskreten Photonenenergien, wie sie bei Verwendung von Eichquellen auftreten, simuliert.
Die Ergebnisse der Simulation werden vorgestellt und mit Messungen verglichen.

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

HK 46.61 Do 16:00 HZ Poster

Investigation of work functions for precision experiments to investigate the standard electroweak model — •Marcus Beck[1,2], Werner Heil[1], Ernst W. Otten[1], Christian Schmidt[1], and Alexander Wunderle[1] — [1]Institut für Physik, Johannes Gutenberg-Universität Mainz, Germany — [2]Helmholtz-Insitut Mainz, Germany

The standard model of the electroweak interaction is tested with ever increasing precision by non-accelerator experiments, e.g. using beta decay. The precision of these experiments has reached a point where the variation of the work function of the materials used for electrodes starts to limit the sensitivity. We investigate these variations of the work function for the aSPECT and the KATRIN experiments using a scanning Kelvin probe and the photoelectric effect. In 2013 aSPECT had a successfull beam time at the cold neutron beam line PF1b at the Institut Laue Langevin to determine the ratio of the weak coupling constants g_A/g_V. KATRIN is being set-up at the Karlsruhe Institute for Technology to measure the absolute mass of the electron-antineutrino. In order to achieve the sensitivity goals of these experiments the variation of the work function of their electrodes in time and space have to be known at the level of 10 meV. Systematic studies of the work function of various surfaces covered with a thin gold layer will be presented.

HK 46.62 Do 16:00 HZ Poster

Study of the PANDA barrel DIRC prototype timing resolution — •Marvin Krebs[1,2], Klaus Peters[1,2], Carsten Schwarz[1], and Jochen Schwiening[1] for the PANDA-Collaboration — [1]GSI Helmholtzzentrum fuer Schwerionenforschung GmbH, Darmstadt — [2]Goethe- Universitaet, Frankfurt am Main

The PANDA experiment at the new Facility for Antiproton and Ion Research in Europe (FAIR) at GSI, Darmstadt, will study fundamental questions of hadron physics and QCD. A DIRC (Detection of Internally Reflected Cherenkov light) counter will provide hadronic particle identification (PID) in the barrel region of the PANDA detector. In

order to meet the PID requirements the DIRC has to provide precise measurements of the Cherenkov angle and the propagation time of single photons. A barrel DIRC prototype was successfully tested with particle beams at CERN in 2012. A detailed study was performed after the beam time to understand the observed timing resolution and the contributions from the photon detectors, trigger system, and the electronics. The prototype readout system, including the TRBs (Trigger and Readout Boards) and the current generation of MCP-PMTs (Micro Channel Plate - Photo Multiplier Tubes) was studied using electronic pulsers and picosecond laser pulsers. We present measurements of the single photon timing resolution as a function of critical parameters like signal amplitudes, signal slopes, and sensor occupancy. Work supported by EU6 grant, contract number 515873, DIRACsecondaryBeams, and EU FP7 grant, contract number 227431, HadronPhysics2, and the Helmholtz Graduate School for Hadron and Ion research

HK 46.63 Do 16:00 HZ Poster

First test results of TRD prototypes for CBM with alternating wires — •Pascal Dillenseger, Susanne Gläßel, and Florian Roether — Institut für Kernphysik Frankfurt

The CBM (Compressed Baryonic Matter) at FAIR will be dedicated to the exploration of the QCD phase diagram in the region of high net-baryon densities using heavy-ion collisions. The CBM Transition-Radiation Detector (TRD) has to deliver a good tracking and electron identification performance in an unprecedented high particle-density environment. A thin Multi-Wire Proportional Chamber (MWPC) without drift region delivers the required fast detector response for the expected high signal rates.
One key challenge is to achieve stability of the gas gain. To reduce its sensitivity to cathode deformations, an alternating wire structure, as proposed for the ALICE VHMPID (Nucl. Instrum. Meth. A698 (2013) 11-18), is exploited. Field wires are introduced between the sense wires to improve the field line distribution and its stability. An asymmetric structure, i.e. one cathode is closer to the wire plane than the other, provides fast removal of positive ions. Prototypes with standard and alternating field wires, symmetric and asymmetric structure, and different pad planes have been build and tested with an ^{55}Fe source to measure position and pressure dependent gain variations.
Supported by BMBF and the Helmholtz Association.

HK 46.64 Do 16:00 HZ Poster

Automatisierung von Messprozeduren zur systematischen Charakterisierung von Pixelsensoren* — •Benjamin Linnik für die CBM-MVD-Kollaboration — Goethe-Universität, Frankfurt

Die Strahlenhärte von monolithischen CMOS-Pixelsensoren (MAPS), wie sie im ILC, im Heavy-Flavour-Tracker von STAR, ITS-Upgrade von ALICE und Mikro-Vertex-Detektor von CBM verwendet werden sollen, ist Thema eines Forschungs- und Entwicklungsprojekt zwischen IKF Frankfurt und IPHC Straßburg. Sie konnte im vergangenem Jahrzehnt durch Strahlenhärtestudien stark verbessert werden.

Die dafür notwendigen systematischen Strahlenhärtestudien erfordern die Analyse einer großen Zahl von Prototypsensoren nach einem standardisierten Messprotokoll unter kontrollierten Laborbedingungen. Wir stellen in diesem Beitrag ein automatisches Überwachungs- und Automatisierungssystems vor namens **M**APS **A**utomatic **B**ot **S**ystem (MABS), welches zur Vereinfachung und Beschleunigung der Messserien entwickelt wurde. Dieses überwacht und koordiniert als primäre Aufgabe die Datenaufnahme und Chipprogrammierung jeder einzelnen Messung. Weiterhin wurden Schnittstellen entwickelt für z.B. eine Temperaturüberwachung oder die Einbindung externer Laborgeräte. Zusätzlich erstellt das System eine umfangreiche Dokumentation aller Parameter und verfügt über Schnittstellen zum Onlinemonitoring über Webbrowser und mobiler Endgeräte.

*gefördert durch HGS-HIRe, BMBF (05P12RFFC7), HIC for FAIR, EU-FP7 and GSI.

HK 46.65 Do 16:00 HZ Poster

Status of the TRIGA User Facility in Mainz — •Fabian Kories[1], Klaus Eberhardt[2], Gabriele Hampel[2], Werner Heil[1], Jan Peter Karch[1], Tobias Reich[2], Yury Sobolev[1], and Norbert Trautmann[2] — [1]Institut für Physik, Johannes Gutenberg Universität Mainz — [2]Institut für Kernchemie, Johannes Gutenberg Universität Mainz

Ultra-cold neutrons (UCN) offer unique opportunities for investigating the properties of the free neutron with exceptionally high precision such as the measurement of its lifetime.

At the pulsed TRIGA reactor in Mainz, a superthermal UCN source using solid deuterium as converter is operational and delivers up to 10 UCN/cm^3 in typical storage volumes of 10 l.

Within PRISMA Cluster of excellence, this source will be upgraded to a targeted strength of 100 UCN/cm^3 in order to transform TRIGA Mainz into a world-leading user facility for UCN research. Besides the installation of a He liquefier to sustain long-term experiments, the existing neutron guides have to be replaced by high-quality guides with low surface roughness which are internally coated with Ni-58 to increase the phase space for UCN transport.

The poster gives a status report on the activities at the UCN source at TRIGA Mainz.

HK 46.66 Do 16:00 HZ Poster

Kalibrierung und Effizienz eines Neutronendetektor-Arrays für (e,e'n) Experimente — •Maxim Singer, Anna Maria Krumbholz 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 Elektronenstreuexperimenten 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.

Für den experimentellen Einsatz des Detektorballs muss zunächst die Effizienz der Neutronendetektoren und die Nachweiswahrscheinlichkeit für Mehrneutronenereignisse sowie die Crosstalk-Eigenschaften des Gesamtaufbaus vermessen werden. Präsentiert werden die Ergebnisse der Effizienzbestimmung des Detektorballs anhand der Vermessung des Energiespektrums einer Cf-252-Quelle mit bekannter Neutronenmultiplizität, welche mit der Flugzeitmethode in einer Koinzidenzschaltung mit den Spaltfragmenten durchgeführt wird. Die Crosstalk-Eigenschaften, bestimmt aus einem Vergleich des gemessenen Cf-252-Energiespektrums mit dem in GEANT4 simulierten, werden gezeigt.
[1] M. Chernykh, Dissertation, D17, Technische Universität Darmstadt, (2008).

HK 46.67 Do 16:00 HZ Poster

Magnetic field mapping at the BGO-OD experiment — •Philipp Bielefeldt for the BGO-OD-Collaboration — Physikalisches Institut, Universität Bonn, Nussallee 12, D-53115 Bonn

The new BGO-OD experiment at the ELSA accelerator, Bonn, is built to systematically investigate meson photoproduction, with measures planned for associated strangeness, vector and pseudoscalar meson final states. A nearly 4π acceptance central BGO calorimeter is complemented by a tracking magnetic spectrometer in forward direction.

In order to optimise the spectrometer's resolution, a thorough understanding of the magnet's fringe fields is needed, obtained from both simulation and precision measurements. A short overview of simulation and measurement techniques as well as a comparison of their recent results will be given and the effect on BGO-OD's momentum reconstruction will be discussed.

HK 46.68 Do 16:00 HZ Poster

Study of the PANDA Barrel DIRC prototype timing resolution — •Marvin Krebs[1,2], Klaus Peters[1,2], Carsten Schwarz[1], and Jochen Schwiening[1] — [1]GSI Helmholtzzentrum fuer Schwerionenforschung GmbH, Darmstadt — [2]Goethe-Universität Frankfurt am Main

The PANDA experiment at the new Facility for Antiproton and Ion Research in Europe (FAIR) at GSI, Darmstadt, will study fundamental questions of hadron physics and QCD. A DIRC (Detection of Internally Reflected Cherenkov light) counter will provide hadronic particle identification (PID) in the barrel region of the PANDA detector. In order to meet the PID requirements the DIRC has to provide precise measurements of the Cherenkov angle and the propagation time of single photons. A barrel DIRC prototype was successfully tested with particle beams at CERN in 2012. A detailed study was performed after the beam time to understand the observed timing resolution and the contributions from the photon detectors, trigger system, and electronics. The prototype readout system, including the TRBs and the current generation of MCP-PMTs was studied using electronic pulsers and picosecond laser pulsers. We present measurements of the single photon timing resolution as a function of critical parameters like signal amplitudes, signal slopes and sensor occupancy. Work supported

by EU FP7 grant, contract number 227431, HadronPhysics2, and the Helmholtz Graduate School for Hadron and Ion research HGS-HIRe

HK 46.69 Do 16:00 HZ Poster

Fluent Simulations for the Cryogenic Stopping Cell for the low energy branch at FAIR — •Frank Morherr for the FRS Ion Catcher-Collaboration — JLU Giessen

A cryogenic stopping cell (CSC) has been developed for the low-energy branch of the Super-FRS at FAIR, GSI, Germany. The stopping cell technique is based on the stopping of in-flight separated high energetic ions in a noble gas, Helium in our case. The system design is based on the Super-FRS beam properties. By SIMION simulations the flow of the Ions in the DC-field along the stopping cell length and the ion trajectories along the DC-field of the CSC and the behavior of the RF carpet have been simulated using SIMION code in our group. Until now simulations of the gas flow are missed. Especially the design of the nozzle, where the Ions leave the stopping cell has not been investigated in detail. In the current design a straight extraction nozzle is used. With a laval-nozzle there exists a convergent solution. The goal is, to design an extraction nozzle such, that the gas flow through the nozzle becomes stable for high densities to lead the Ions. So they can be catch by the extraction RFQs. For low densities far away the gas must escape sideward so it is possible to pump it away. The gas dynamics at the extraction nozzle have been simulated using ASNYS Fluent Calculations, they will be combined with ion optics simulations, first results will be presented and allow understanding the behavior of the ions.

HK 46.70 Do 16:00 HZ Poster

Layout of the Micro Vertex Detector for CBM* — •Tobias Tischler, Samir Amar-Youcef, Michael Deveaux, Michal Koziel, Christian Müntz, and Joachim Stroth for the CBM-MVD-Collaboration — Goethe Universität, Frankfurt

For the reconstruction of open charm hadrons with the CBM experiment, a Micro Vertex Detector (MVD) with an excellent resolution of the secondary decay vertex (< 70 μm along the beam axis) is required. To achieve this vertex resolution a material budget of a few 0.1% X_0 is mandatory for the individual detector stations positioned downstream in close vicinity to the target. To further reduce the multiple scattering the MVD operates in moderate vacuum.

In this contribution, we will present the planned layout of the MVD, guided by constraints regarding the acceptance of CBM, space limitations as well as technical aspects of module production. The layout employs the actual geometry of the Monolithic Active Pixel Sensors to be used in the MVD, as well as advanced sensor support materials , heat sinks and further supporting structures. The resulting CAD layout was then converted to the corresponding Geant geometry and implemented into the CBM simulation package (CbmRoot). A dedicated software code was used to estimate a material budget in the case of a SIS−100 setup. The results will be presented and discussed.

*supported by HIC for FAIR, GSI , BMBF (05P12RFFC7), EU-FP7 HadronPhysics3

HK 46.71 Do 16:00 HZ Poster

Nicht-ionisierende Strahlenhärte eines hochohmigen CMOS Monolithic Active Pixel Sensors mit bis zu $80\mu m$ **Pixelgröße*** — •Stefan Strohauer für die CBM-MVD-Kollaboration — Goethe-Universität, Frankfurt

Zur Verbesserung der Strahlenhärte von monolithischen CMOS-Pixelsensoren (MAPS) arbeiten das IKF Frankfurts und das IPHC Straßburgs an einem Forschungs- und Entwicklungsprojekt, um diese Sensoren im Mikrovertex-Detektor des zukünftigen CBM-Experimentes einzusetzen. Weiterhin sollen sie im Heay-Flavour-Tracker von STAR, im ITS-Upgrade von ALICE, wie auch im ILC eingesetzt werden. Durch die Verwendung eines hochohmigen aktiven Volumens von $1k\Omega cm$ konnte die Strahlenhärte für nicht-ionisierende Strahlung vergrößert werden.

Die Pixelgröße wurde bisher zum Erreichen der nicht-ionisierenden Strahlenhärte minimiert. Allerdings wird die geforderte sekundäre Vertexauflösung von $50\mu m$ auch mit größeren Pixeln erreicht. Auf Grund der verbesserten Strahlenhärte hochohmiger Sensoren kann es sinnvoll sein, die Pixelgröße nun wieder anzuheben, denn dadurch kann die Integrationszeit und die Leistungsaufnahme von MAPS verringert werden.

Hierdurch motiviert wurde die Strahlenhärte des hochohmigen Sensors MIMOSA-29 mit einer Pixelgröße von bis zu $80\mu m$ studiert. Neben der Pixelgröße wurden verschiedene Pixelgeometrien mit unterschiedlicher Diodenzahl pro Pixel untersucht.

*gefördert durch das BMBF (05P12RFFC7), HIC for FAIR und GSI.

HK 46.72 Do 16:00 HZ Poster

Hardware upgrade for A2 data acquisition — Michael Ostrick, Wolfgang Gradl, Peter-Bernd Otte, Andreas Neiser, Oliver Steffen, •Martin Wolfes, and Tito Körner for the A2-Collaboration — Institut für Kernphysik, Mainz, Deutschland

The A2 Collaboration uses an energy tagged photon beam which is produced via bremsstrahlung off the MAMI electron beam. The detector system consists of Crystal Ball and TAPS and covers almost the whole solid angle. A frozen-spin polarized target allows to perform high precision measurements of polarization observables in meson photo-production.

During the last summer, a major upgrade of the data acquisition system was performed, both on the hardware and the software side. The goal of this upgrade was increased reliability of the system and an improvement in the data rate to disk. By doubling the number of readout CPUs and employing special VME crates with a split backplane, the number of bus accesses per readout cycle and crate was cut by a factor of two, giving almost a factor of two gain in the readout rate.

In the course of the upgrade, we also switched most of the detector control system to using the distributed control system EPICS. For the upgraded control system, some new tools were developed to make full use of the capabilities of this decentralised slow control and monitoring system.

The poster will present some of the major contributions to this project.

HK 46.73 Do 16:00 HZ Poster

Development of a time projection chamber for Crystal Ball at MAMI — •Oliver Steffen, Martin Wolfes, and Wolfgang Gradl for the A2-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz

The Crystal Ball Collaboration uses energy tagged bremstrahlung photons produced from the MAMI electron beam to study photo-induced reactions on nucleons and nuclei. The Crystal Ball/TAPS 4π calorimeter setup is optimized for the detection of neutral final states. Charged particles are identified and measured by the inner detector system including a two layer MWPC. The increased rate of charged particles in current and future experiments exceeds the rate capability of these MWPCs.

We are developing a small Time Projection Chamber with triple GEM readout meeting the stringent space requirements of the Crystal Ball experiment. This new tracking detector will feature higher rate capabilities and allows better track reconstruction. We are investigating the use of Carbon Fiber Reinforced Plastics (CFRP) to build light but strong chamber walls. First tests with carbon fiber prepregs show promising results. In addition we are using the PLUTO event generator to study the detector acceptance under our experiment conditions. Similar simulations are done to optimize the number and the shape of the readout pads.

This poster will give an overview of the current status of the project and present the latest results.

HK 46.74 Do 16:00 HZ Poster

Development of a cooling system and vacuum chamber for the pion tracker for HADES — •Tobias Schmitt for the HADES-Collaboration — TU München, James-Franck-Straße, D-85748 Garching

One of the future experiments planned at SIS18 with the HADES spectrometer in GSI Darmstadt envisages the employment of a pion beam colliding on a LH2 or a nuclear target. Due to the fact that the secondary pion beam has a high momentum spread, the momentum for each induvidual pion has to be measured for the planned exclusive measurements.

For this purpose our group develops a pion tracking system, consisting of two double sided striped silicon detectors. Both will be located at different positions in the beamline in front of the HADES experiment, therefore they have to deal with high particle rates. Considering the detection of pions (MIPs), the noise of the detectors has to have a very small level. This can be achieved by cooling.

For now the final version of the detector chamber and cooling system has been built and is currently tested. The proposed poster will show the current status and performance of the cooling system for the silicon detector, focusing on the reduction of the leakage current and

the noise.

This work is supported by the Excellence Cluster Universe.

HK 46.75 Do 16:00 HZ Poster

Design of a Beam Position Sensitive Cavity as a Schottky Noise Detector for Mass Measurements in CR@FAIR — •Xiangcheng Chen[1], Shahab Sanjari[2,1], Peter Hülsmann[1], Yuri Litvinov[1,3], Fritz Nolden[1], Jeremi Piotrowski[4], and Markus Steck[1] — [1]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — [2]ExtreMe Matter Institute, Darmstadt, Germany — [3]Max-Planck-Institut für Kernphysik, Heidelberg, Germany — [4]AGH University of Science and Technology, Krakow, Poland

Mass is one of fundamental characteristics of a nucleus. It plays an important role in many areas of physics, as well as other science branches. Especially in nuclear astrophysics, the masses of unstable nuclei close to nucleon drip lines are of great interests, since they are indispensable quantities for modelling nucleosynthesis processes in stellar objects. The Facility for Antiproton and Ion Research (FAIR), by providing high-intensity high-energy secondary beams, will enable unprecedented opportunities to investigate such nuclei. In particular, the collector ring (CR) is designed to be operated in the isochronous ion-optical mode as a high precision mass spectrometer. In order to satisfy the stringent requirements on accuracy and sensitivity for the future mass measurements, a non-destructive detector that is sensitive to single ions is being developed. Owing to the position sensitivity, it will be possible to correct for errors originating from different orbit lengths. In this work, we present simulation results of several possible designs of a cavity-based detector and discuss their potential applications as Schottky-noise detectors.

HK 46.76 Do 16:00 HZ Poster

Data quality assessment for the ALICE Photon Spectrometer PHOS — •Dominik Herzig for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment is designed to study the properties of strongly interacting matter at high energy densities with high precision.
The ALICE PHOS detector is a high resolution electromagnetic calorimeter to measure the position and energy of photons produced in heavy ion collisions. The PHOS consists of 17920 lead-tungstate crystal towers organized in 5 modules.
A vital part of the analysis of the PHOS data is the evaluation of bad towers. Miscalibrated or malfunctioning towers need to be excluded before further data analysis can start.
We present a data driven approach to bad tower identification. Observables such as the average hit energy or the average hit number per cell are used in this approach. The results are compared to alternative methods of bad channel QA already used for the PHOS analysis.
Supported by BMBF and the Helmholtz Association.

HK 46.77 Do 16:00 HZ Poster

CoTEx - Coil tests for the neutron lifetime experiment PENeLOPE — •Dominic Gaisbauer for the PENeLOPE-Collaboration — Technische Universität München, Physikdepartment E18

PENeLOPE is an experiment with ultra-cold neutrons (UCN) for determining their lifetime in a magneto-gravitational trap with special designed superconducting coils developed at Technische Universität München. It is designed to have a precision of up to 'pm 0.1s. Due to their unique characteristics all coils for the trap have to be trained and tested in a preliminary experiment called CoTEx before they can be inserted into PENeLOPE. The poster will highlight the results of the first welded coil stack delivered in December 2013. A short overview of CoTEx in general and the slow control and quench detection of CoTEx will also be presented.

This project is supported by the Deutsche Forschungsgemeinschaft, the Maier-Leibnitz-Laboratorium Garching and the Cluster of Excellence "Origin and Structure of the Universe".

HK 46.78 Do 16:00 HZ Poster

Simplified Object Oriented Data Analysis at the BGO-OD Experiment — •Oliver Freyermuth for the BGO-OD-Collaboration — Physikalisches Institut, Nussallee 12, D-53115 Bonn

The ROOT-based analysis framework ExPlORA is used at the BGO-OD Experiment at the electron accelerator ELSA at Bonn university. Its modular structure allows to simplify the application of cuts to experimental data and the visualization of results. A set of generic plugins and tools to allow for both quick and thorough analyses and postprocessing of the output has been developed. It integrates with the XML-based configuration of ExPlORA and can be used without knowledge of the internals of the framework. Care has been taken to achieve the execution speed of compiled code without the requirement of extensive programming knowledge.
This work is supported by the DFG (SFB/TR-16).

HK 46.79 Do 16:00 HZ Poster

A Web 2.0 Approach to DAQ Monitoring and Controlling — •Manuel Penschuck for the TRB3-Collaboration — Goethe-Universität, Frankfurt

In the scope of experimental set-ups for the upcoming FAIR experiments, a FPGA-based general purpose trigger and read-out board (TRB3) has been developed which is already in use in several detector set-ups (e.g. HADES, CBM-MVD, PANDA). For on- and off-board communication between the DAQ's subsystems, TrbNet, a specialised high-speed, low-latency network protocol developed for the DAQ system of the HADES detector, is used. Communication with any computer infrastructure is provided by Gigabit Ethernet.

Monitoring and configuration of all DAQ systems and front-end electronics is consistently managed by the powerful slow-control features of TrbNet and supported by a flexible and mature software tool-chain, designed to meet the diverse requirements during development, setup phase and experiment. Most building blocks offer a graphical-user-interface (GUI) implemented using omnipresent web 2.0 technologies, which enable rapid prototyping, network transparent access and impose minimal software dependencies on the client's machine.

This contribution will present the GUI-related features and infrastructure highlighting the multiple interfaces from the DAQ's slow-control to the client's web-browser.

* supported by BMBF (05P12RFFC7), BMBF (05P12RFGHJ), HIC for FAIR, and GSI.

HK 46.80 Do 16:00 HZ Poster

Commissioning of a pulsed UV photoelectron source at the KATRIN main spectrometer — Jan Behrens[1], Stefan Groh[2], •Volker Hannen[1], Raphael Jöhren[1], Lorenz Josten[1], Nicholas Steinbrink[1], Christian Weinheimer[1], Daniel Winzen[1], Michael Zacher[1], and Miroslav Zbořil[1] for the KATRIN-Collaboration — [1]Westfälische Wilhelms-Universität, Institut für Kernphysik, Münster, Germany — [2]Karlsruher Institut für Technologie, KIT Zentrum für Elementarteilchen- und Astrophysik, Karlsruhe, Germany

The KATRIN experiment aims to measure the electron neutrino mass with a sensitivity of < 0.2 eV at 90% confidence level. The measurement is accomplished by scanning the endpoint of the tritium β-spectrum with an electrostatic spectrometer, based on the MAC-E-Filter (magnetic adiabatic collimation with an electrostatic filter). For the calibration of the spectrometer a mono-energetic, angular selective UV photoelectron source had been developed and constructed in Münster (see K. Hugenberg, Prog. Part. Nucl. Phys. **64** (2010) 288). This electron source has been used in the successful commissioning of the main spectrometer and detector system in summer 2013. The poster will present the characteristics of the electron source determined during the spectrometer measurements.
This work is supported by BMBF under 05A11PM2.

HK 46.81 Do 16:00 HZ Poster

CALIFA at R3B: Development of Quality Assurance system for APD — •Han-Bum Rhee, Alexander Ignatov, Stoyanka Ilieva, Thorsten Kröll, and Mirko von Schmid for the R3B-Collaboration — Technische Universität, Darmstadt, Germany

CALIFA is a calorimeter and spectrometer that aims to detect gamma-rays and light charged particles. It is a part of the R^3B experiment at the future FAIR facility. The CALIFA barrel consists of CsI(Tl) scintillating crystals, which are individually read out with Avalanche Photodiodes. While APDs are insensitive to magnet fields, its gain depends with temperature and voltage. Therefore, we have developed and built the quality assurance testing system for double APDs. In order to control the temperature, we made a water circulation system. We use a light signal from a pulsed LED,which is distributed to the active area of the APDs, to measure the gain variation of APD. In this presentation, we explain the concept of the QA testing system and report the results of the QA test.

This work is supported by BMBF(06DA9040I,05P12RDFN8) and HIC for FAIR.

HK 46.82 Do 16:00 HZ Poster

Radiation hardness studies of epitaxial diodes for the PANDA Micro-Vertex-Detector — •Tommaso Quagli[1], Kai-Thomas Brinkmann[1], Daniela Calvo[2], and Robert Schnell[1] for the PANDA-Collaboration — [1]II. Physikalisches Institut, Justus-Liebig-Universität Gießen, Gießen, Germany — [2]INFN, Sezione di Torino, Torino, Italy

PANDA is a key experiment of the future FAIR facility, under construction in Darmstadt, Germany. It will study the collisions between an antiproton beam and a fixed proton or nuclear target. The Micro Vertex Detector (MVD) is its innermost detector and is composed of four concentric barrels and six forward disks, instrumented with silicon hybrid pixel and double-sided microstrip detectors. It serves the identification of primary and secondary vertices. The main requirements include high spatial and time resolution, trigger-less readout with high rate capability, good radiation tolerance and low material budget.

In order to investigate the radiation hardness of the silicon pixel sensors, irradiation studies were performed on diodes using a proton beam at the Bonn Isochronous Cyclotron. The diodes featured an epitaxial layer grown on a Czochralski substrate; the thicknesses of the epitaxial layers were 100 μm and 150 μm, respectively. Additionally, some of the samples were treated with an oxygenation process.

The study was performed with two different fluences, comparing the I-V and C-V curves of the non-irradiated diodes with the ones obtained immediately after the irradiation and after an annealing phase.

Supported by BMBF, HGS-HIRe, INFN and JCHP.

HK 46.83 Do 16:00 HZ Poster

Performance Tests of novel Scintillator Materials and Readout devices for the CALIFA@R^{3}B — •Christian Sürder, Guillermo Fernández Martinez, Ilja Homm, Alexander Ignatov, Tania Ilieva, Thorsten Kröll, Han-Bum Rhee, and Mirko von Schmid — Institut für Kernphysik, Technische Universität Darmstadt, Germany

CALIFA (**CAL**orimeter for the **I**n **F**light detection of γ-rays and light charged p**A**rticles) is part of the R^{3}B project. It will be realized at FAIR (**F**acility for **A**ntiproton and **I**on **R**esearch), which is built at the GSI Helmholtzzentrum für Schwerionenforschung GmbH. The CALIFA consists of the Barrel part, covering central angles and the End-Cap part for the forward angles. The requirement to detect high energy gamma rays with good efficiency and the presence of a magnetic field lead to numerous implications on the detector technology. In this work we investigate the possibility to use novel scintillating materials, namely $LaBr_3$:(Ce) and $CeBr_3$ with APDs (**A**valanche **P**hoto **D**iode) and SiPM (**Si**licon **P**hoto**M**ultiplier) readout.
This work is supported by BMBT (06DA9040I, 05P12RDFN8) and HIC for FAIR.

HK 46.84 Do 16:00 HZ Poster

High-Voltage Picoamperemeter — •Andrea Bugl[1], Markus Ball[1], Michael Böhmer[1], Sverre Dörheim[1], Andreas Hönle[1], Igor Konorov[1], and Bernhard Ketzer[1,2] — [1]Technische Universität München, Garching — [2]Helmholtz-Institut für Strahlen- und Kernphysik, Bonn

Current measurements in the nano- and picoampere region on high voltage are an important tool to understand charge transfer processes in micropattern gas detectors like the Gas Electron Multiplier (GEM). They are currently used to e.g. optimize the field configuration in a multi-GEM stack to be used in the ALICE TPC after the upgrade of the experiment during the 2nd long shutdown of the LHC.

Devices which allow measurements down to 1pA at high voltage up to 6kV have been developed at TU München. They are based on analog current measurements via the voltage drop over a switchable shunt. A microcontroller collects 128 digital ADC values and calculates their mean and standard deviation. This information is sent with a wireless transmitting unit to a computer and stored in a root file. A nearly unlimited number of devices can be operated simultaneously and read out by a single receiver. The results can also be displayed on a LCD directly at the device. Battery operation and the wireless readout are important to protect the user from any contact to high voltage.

The principle of the device will be explained and systematic studies of their properties will be shown.

Supported by the DFG Cluster of Excellence "Universe" and the EU 7th framework program.

HK 46.85 Do 16:00 HZ Poster

Construction of the XENON1T purification system and slow control — •Sergej Schneider, Ethan Brown, Christian Huhmann, Stephan Rosendahl, and Christian Weinheimer — Institut für Kernphysik, Universität Münster

A fundamental and still unanswered question in astrophysics is the nature of dark matter. A promising approach for a direct detection of a Weakly Interacting Massive Particle (WIMP) is the search for a recoil signal in a dual phase xenon time projection chamber. The XENON Dark Matter Project is currently upscaling from 62 kg detector to the ton scale detector XENON1T to reach sensitivity for a 100 GeV/c^2 particle with a cross section of $\sigma = 2 \cdot 10^{47}$cm^2. When aiming at such a high sensitivity it is crucial to provide extremely pure xenon as detector material in order to allow for a high light and charge collection. These signals are attenuated by trace electronegative impurities.

Electronegative impurities are being removed in the purification system of XENON1T by constantly circulating the xenon gas through a high temperature getter. This system is monitored and controlled by a slow control system in order to acquire data, send out alarms in case of dysfunctions and allow to operate relevant devices from a control panel. The construction of the XENON1T purification system and implementation of the slow control will be presented. This work is funded by BMBF.

HK 46.86 Do 16:00 HZ Poster

Characterization of a transverse electron target for storage rings — •Sabrina Geyer[1], Oliver Meusel[1], and Oliver Kester[1,2] — [1]Goethe Universität, Frankfurt, Germany — [2]GSI, Darmstadt, Germany

For the investigation of electron-ion interaction processes at storage rings a transverse electron target has been developed. A sheet beam of free electrons is focused by electrostatic fields through a defined interaction region. Its open geometry is suited to electron and photon spectroscopy. The adjustable electron energy ranges between several tens eV and a few keV. The target is dedicated to the storage rings of the Facility for Antiproton and Ion Research (FAIR).

Simulations regarding the energy resolution and the optical behaviour have been performed. The target is currently under characterization at a test bench. First experimental results will be presented.

HK 46.87 Do 16:00 HZ Poster

Quality assessment of ultra-thin CMOS sensors for the micro vertex detector of the CBM experiment at FAIR. — •Michal Koziel, Norbert Bialas, and Borislaw Milanovic for the CBM-MVD-Collaboration — University of Frankfurt, Germany.

The Compressed Baryonic Matter experiment installed at the future FAIR facility will be equipped with a high-precision micro-vertex detector aiming at an outstanding primary and secondary vertex resolution. Highly granular, ultra-low material budget sensors, so-called Monolithic Active Pixel Sensors,, manufactured at standard CMOS process, will be employed. Imperfections in CMOS process as well as further dicing and thinning procedures affect the yield of sensors to be mounted in the detector stations. To select sensors with the best characteristics, probe testing prior to integration is mandatory. However, handling and testing of 50-um thin CMOS pixel sensors is non-standard . This contribution will present the dedicated tools and procedures, focusing on the question whether such thin devices can be efficiently and reliably probe-tested.

*supported by HIC for FAIR, GSI , BMBF (05P12RFFC7), EU-FP7 HadronPhysics3

HK 46.88 Do 16:00 HZ Poster

A New Avalanche Photo Diode Readout for the Crystal Barrel Calorimeter — •Peter Klassen for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Nussallee 14-16, 53115 Bonn, Germany

The CBELSA/TAPS experiment at ELSA measures double polarisation observables in meson photoproduction off protons and neutrons. To be able to measure purely neutral reactions on a polarized neutron target with high efficiency, the main calorimeter has to be integrated into the first level trigger. This requires to exchange the existing PIN photo diode by a new avalanche photo diode (APD) readout.

The newly developed readout electronics will provide an energy resolution compatible to the previous set-up and a fast trigger signal down to 10 MeV energy deposit per crystal. After the successful final tests with a 3x3 CsI crystal matrix in Bonn at ELSA and in Mainz at MAMI all front-end electronics were produced in fall 2013. Automated test routines for the front-end electronics were developed and the characterisation measurement of all APDs was successfully accomplished

in Bonn. At the end of January 2014 the first half of the Crystal Barrel will be disassembled and the installation of the new APD readout will start. This poster presents the performance of the final front-end set-up, the progress of the ongoing APD installation and the current state of the back-end electronics development.

Supported by the Deutsche Forschungsgemeischaft (SFB/TR16) and Schweizerischer Nationalfonds.

HK 46.89 Do 16:00 HZ Poster

Die $\bar{\text{P}}$ANDA-Vorwärtsendkappe: Simulationen und deren Vergleich mit Prototyptestmessungen — •Christian Hammann, Matthias Kube, Claudia Lütz, Philipp Mahlberg, Merlin Rossbach, Christoph Schmidt, Ulrike Thoma, Georg Urff und Christoph Wendel für die PANDA-Kollaboration — HISKP, Universität Bonn, Deutschland

Eine wichtige Detektorkomponente des $\bar{\text{P}}$ANDA Experimentes an FAIR ist das elektromagnetische Kalorimeter (EMC). Das EMC des Targetspektrometers wird aus ca. 15500 Bleiwolframat-Kristallen bestehen, die bei -25°C betrieben werden. Die Kristalle sollen größtenteils mit jeweils zwei APDs ausgelesen werden. Im inneren Bereich der Vorwärtsendkappe sollen die Kristalle hingegen, aufgrund dort zu erwartenden hohen Raten, mit VPTTs bestückt werden.

Zum besseren Verständnis dieses Detektors existiert eine Geant4 basierte Simulation. Mit deren Hilfe können charakteristische Eigenschaften der Vorwärtsendkappe, wie deren Energie- und Ortsauflösung, untersucht werden. Um die Simulation der Vorwärtsendkappe zu überprüfen, wurden am SPS-Beschleuniger am CERN Testmessungen an einem Prototypen mit Elektronen in einem Energiebereich von 5 bis 15 GeV durchgeführt. Die Bedingungen der Teststrahlzeit wurden in der Simulation nachgebildet. Dies gilt insbesondere für das Strahlprofil und die Ausrichtung des Detektors relativ zum Elektronenstrahl.

In diesem Beitrag wird der Vergleich der Simulation mit den Testmessungen diskutiert.

Gefördert durch das BMBF(FKZ: 05P12PDFP5).

HK 46.90 Do 16:00 HZ Poster

Ein digitales Echtzeit-Trigger-System für den CALIFA Detektor — •Philipp Klenze, Michael Bendel, Roman Gernhäuser, Benjamin Heiss, Walter Henning, Reiner Krücken, Tudi Le Bleis, Patrick Remmels und Max Winkel für die R3B-Kollaboration — Physik Department E12, Technische Universität München

Das CALIFA Kalorimeter mit seinen etwa 3000 Szintillationskristallen ist eine der wesentlichen Komponenten des R^3B- Spektrometers. Eine besondere Herausforderung ist hier die schnelle Generierung von komplexen Trigger-Entscheidungen für das gesamte Detektorsystem in Echtzeit. Detektorweite Energiesummen oder Multiplizitäten stellen ebenso wie die besondere Behandlung bestimmter Triggermuster ein wesentliches Werkzeug zur präzisen Vorauswahl von relevanten Ereignissen dar.

Um die dazu notwendigen Informationen innerhalb von $1-2\mu$s sammeln und verarbeiten zu können, wird ein neuartiger, asynchroner, digitaler Summierer-Baum auf Basis von verzögerungsarmen CPLDs und FPGAs entwickelt. Um die bereits vorhandene Infrastruktur zur Steuerung und Auslese nutzen zu können, wird dies mit kompakten Addon-Boards in die bestehende Ausleseelektronik integriert.

HK 46.91 Do 16:00 HZ Poster

Characterization of the PANDA MVD Trapezoidal Silicon Strip Sensors and the Development of their Readout System — •Dariusch Deermann, Tobias Stockmanns, and James Ritman for the PANDA-Collaboration — Forschungszentrum Jülich GmbH

The $\overline{\text{P}}$ANDA-experiment will be one of the main experiments inside the upcoming Facility for Antiproton and Ion Research (FAIR) at the GSI in Darmstadt. The fixed target experiment will explore $\overline{\text{p}}$p annihilation in the charm mass region with intense, phase space cooled beams with momenta between 1.5 and 15 GeV/c.
The innermost subdetector of $\overline{\text{P}}$ANDA will be the Micro Vertex Detector (MVD) and consists of silicon strip and pixel detectors.

In order to operate and test the first trapezoidal strip sensor prototypes of the MVD, they are chracterized with a probestation as well as with a dedicated testboard. Furthermore, the existing Juelich Digital Readout System has to be modified for the trapezoidal sesors.

In this poster the adaption of the Juelich Digital Readout System for the trapezoidal silicon strip sensors as well as their characterization will be presented.