HK 27: Poster

Zeit: Dienstag 16:45–18:45 Raum: F Foyer

HK 27.1 Di 16:45 F Foyer

Extraction of the luminosity at PANDA — •Stefan Pflüger[1], Florian Feldbauer[1], Roman Klasen[1], Heinrich Leithoff[1], Stephan Maldaner[1], Mathias Michel[1], Christof Motzko[1], Tobias Weber[1], and Miriam Fritsch[1,2] — [1]Helmholtz Institut Mainz — [2]Ruhr-Universität Bochum

The high precision experiment PANDA is specifically designed to shed new light on the structure and properties of hadrons. PANDA is a fixed target antiproton proton experiment and will be part of Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany. When measuring the total cross sections or determining the properties of intermediate states very precisely e.g. via the energy scan method, the precise determination of the luminosity is mandatory.

For this purpose, the PANDA luminosity detector will measure the 2D angular distribution of the elastically scattered antiproton trajectories. For the determination of the luminosity the parametrization of the differential cross section in dependence on the scattering angle is fitted to the measured angular distribution. The fit function is highly complex as it is not only able to corrected for the detection efficiency and resolution, but also the antiproton beam shift, spotsize, tilt and divergence. As most of these parameters are extracted from the fit, this method is extremely powerful as it delivers also beam properties. This poster will cover the complete luminosity determination procedure, which is capable of extracting the luminosity with an accuracy in the permille level.

HK 27.2 Di 16:45 F Foyer

Studies in the production of η mesons in the reacation $\mathrm{p + d \to d + \eta + p_{sp}}$ at ANKE* — •Daniel Schröer, Christopher Fritzsch, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster

The production of η mesons in hadronic collisions is an intensively investigated topic. An unexpectedly strong interaction between η mesons and nuclei, which might lead to the formation of mesic nuclei, has been found. For further studis on the characteristics of this interaction the reaction $\mathrm{p + d \to d + \eta + p_{sp}}$ has been measured at the ANKE spectrometer at the COSY accelerator of the Forschungszentrum Jülich. With the deuteron as an effective neuteron target whereas the proton is treated as a spectator particle, the use of two different beam momenta ($p_1 = 2.09$ GeV/c and $p_2 = 2.25$ GeV/c) in combination with the Fermi motion inside the target deuteron allow to the determine total and differential cross sections in an excess energy range from threshold up to Q = 90 MeV. With the gained knowledge of the total cross section, specifically at low Q values, it is possble to determine the scattering length $a_{d\eta}$ of an s-wave final state interaction ansatz. The validity of the s-wave assumption is proven with the differential cross sections. Furthermore the data taken at higher excess energies enable to examine the role of nucleonic resonances in the production process of η mesons. Recent results will be presented and discussed.

HK 27.3 Di 16:45 F Foyer

Study of χ_c Decays into Light Hadrons at BESIII — •Iman Keshk for the BESIII-Collaboration — Ruhr-Universität Bochum, Inst. f. Experimentalphysik I, 44780 Bochum

The BESIII experiment which is located at the symmetric electron-positron ring BEPCII in Beijing has recorded large data samples at center of mass energies corresponding to the $\psi(2S)$ charmonium resonance and other energies in the tau-charm mass range. The radiative transitions $\psi(2S) \longrightarrow \gamma\chi_c$ provide a good source of charmonium P-wave states. Their radiative decays are experimentally less understood than those of the vector states and provide new insight into the nature of the χ_c states. Further, exotic states with quantum numbers not accessible in vector charmonium decays can be studied. In this contribution the radiative decays $\chi_c \longrightarrow \gamma\phi\eta$ and $\chi_c \longrightarrow \gamma\omega\eta$ will be discussed based on a data sample corresponding to about $448 \cdot 10^6$ $\psi(2S)$ events.

Supported by DFG (FOR 2359)

HK 27.4 Di 16:45 F Foyer

Resonance extraction from $(3\pi)^-$ final states — •Sebastian Uhl — Technische Universität München

In order to study the spectrum of light hadrons, the COMPASS experiment at CERN has collected a huge data set with a 190 GeV/c π^- beam impinging on a liquid-hydrogen target. Resonances are diffractively produced at squared four-momentum transfers to the target between 0.1 and 1 $(\mathrm{GeV}/c)^2$. The two-stage magnetic spectrometer with two electromagnetic calorimeters allows us to study final states with charged as well as neutral particles. The two dominant channels are the decays into the $\pi^-\pi^-\pi^+$ and $\pi^-\pi^0\pi^0$ final states. We will report on a method to extract resonance properties from both channels simultaneously.

This work was supported by the BMBF, the Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, the DFG Cluster of Excellence 'Origin and Structure of the Universe' (Exc 153), and by the computing facilities of the 'Computational Center for Particle and Astrophysics' (C2PAP).

HK 27.5 Di 16:45 F Foyer

Development of a correction function for invariant masses of neutral mesons at the CBELSA/TAPS-experiment. — •Nils Stausberg for the CBELSA/TAPS-Collaboration — Helmholtz- Institut für Strahlen- und Kernphysik, Nussallee 14-16, 53115 Bonn

A good understanding of the baryon spectrum needs a precise examinatio of excited states and their decays. In order to extract contributing resonances from the data, cross sections and polarization observables are determined and further investigated by partial wave analysis.

The Crystal Barrel/TAPS experiment is ideally suited to measure the photoproduction of neutral mesons decaying into photons due to its good energy resolution, high detection efficiency for photons, and the nearly complete solid angle coverage.

A good reconstruction of the invariant mass of neutral mesons is of course essential for data analysis. Therefore, not only a precise measurement, but also sophisticated reconstruction techniques are needed. Dead material inside the detector system leads to energy losses in the calorimeter. Those do not only lead to too low photon energies, but also to asymmetric photon energy distributions and finally to angle and energy dependent deviations in the meson masses.

Here, a correction method is discussed using $\pi^0 \to \gamma\gamma$ and $\eta \to \gamma\gamma$ as example.

Supported by the DFG (SFB/TR16).

HK 27.6 Di 16:45 F Foyer

Development of a graphical user interface for the energy calibration of the Crystal Barrel calorimeter — •Ben Salisbury for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Nussallee 14-16, 53115 Bonn

Essential to understand the baryon spectrum is a precise knowledge of the excited states and their decays. Partial wave analysis needs to be performed to extract the contributing resonances from experimental data. In order to find an unambiguous solution, the measurement of polarization observables is necessary. To determine these observables a precise reconstruction of the reactions is indispensable.

With an angular coverage of almost 4π, a high photon detection efficiency and a good energy resolution, the Crystal Barrel/TAPS experiment is very well suited to measure the decay of neutral mesons into photons. To reconstruct the final state particles of a reaction it is necessary to correctly determine the energy deposited by the photons in the detector. Hence each crystal needs to be calibrated, including the gain factor of the electronics chain to retrieve and digitalize the deposited energy. This is done iteratively using the decay $\pi^0 \to \gamma\gamma$ together with the known π^0-mass. A graphical user interface was implemented to reduce the effort involved with the energy calibration of the Crystal Barrel calorimeter.

A short overview over the energy calibration and the most important features of the graphical user interface for the energy calibration will be given.

Supported by the DFG (SFB/TR16).

HK 27.7 Di 16:45 F Foyer

Feasibility studies for the measurement of time-like electromagnetic proton form factors in reactions of the type $\bar{p}p \to \mu^+\mu^-$ at PANDA-FAIR — •Iris Zimmermann[1,2], Manuel Zambrana[1,2], Maria Carmen Mora Espi[2], Frank Maas[1,2,3], Dmitry Khaneft[1,2], and Alaa Dbeyssi[2] for the

PANDA-Collaboration — [1]Institut für Kernphysik, Johannes Gutenberg Universität Mainz, Germany — [2]Helmholtz-Institut Mainz, Germany — [3]Prisma, Cluster of Excellence, Mainz, Germany

This contribution presents the current status of the feasibility studies for the measurement of time-like proton electromagnetic form factors (FF's) using reactions of the type $\bar{p}p \to \mu^+\mu^-$ at the PANDA experiment at FAIR. Electromagnetic form factors are fundamental quantities which parameterize the electric and magnetic structure of hadrons. In the time-like region, the FF's can be accessed through reactions of the type $p\bar{p} \to l^+l^-$, where l = e, μ, under the assumption of one photon exchange. It will be the first time that muon pairs in the final state will be used for the measurement of the TL em FF's of the proton. In frame of the PANDARoot software, which encompasses full detector simulation and event reconstruction, the statistical precision at which the proton FF's will be determined at PANDA is estimated for the signal reaction $p\bar{p} \to \mu^+\mu^-$ at different antiproton beam momenta. The signal identification and the suppression of the main background process ($p\bar{p} \to \pi^+\pi^-$) are studied. The preliminary results at different beam momenta are presented.

HK 27.8 Di 16:45 F Foyer

Feasibility studies of time-like proton electromagnetic form factors at PANDA at FAIR — Heybat Ahmadi[1,2], Samer Ahmed[1,2], Alexander Aycock[1,2], Luigi Capozza[1], Alaa Dbeyssi[1], Bertold Fröhlich[1,2], Phillip Grasemann[1,2], Sebastian Haasler[1,2], David Izard[1], •Dmitry Khaneft[1,2], Jörg Köhler[1,2], Frank Maas[1,2,3], Maria Carmen Mora Espí[1], Oliver Noll[1,2], David Rodríguez Piñeíro[1], Javier Jorge Rico[1], Sahra Wolff[1,2], Manuel Zambrana[1,2], and Iris Zimmermann[1,2] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

The PANDA experiment at the upcoming FAIR accelerator facility will study antiproton annihilation reactions at antiproton beam momenta between 1.5 GeV/c up to 30 GeV/c. Simulation results of the feasibility studies of time-like proton electromagnetic form factors at PANDA are presented. The simulation was performed using the PandaRoot software framework in a wide q^2 range. The signal $\bar{p}p \to e^+e^-$ and the background $\bar{p}p \to \pi^+\pi^-$ channels have been studied using two different methods. Individual signal efficiency and background suppression techniques were applied to extract the proton form factors. The statistical precision of the proton form factors extraction is determined. The results of two methods are consistent with each other. A number of systematic uncertainties have also been evaluated. The competitiveness of the PANDA experiment with existing data and planned experiments is presented.

HK 27.9 Di 16:45 F Foyer

Konzeptstudien für das P2-Experiment an MESA — •Dominik Becker für die P2-Kollaboration — Institut für Kernphysik, JGU Mainz

Das Ziel der P2-Kollaboration ist es, den elektroschwachen Mischungswinkel $\sin^2(\theta_W)$ bei niedrigem Impulsübertrag mit einer relativen Unsicherheit von 0,15 % zu bestimmen. Dies kann durch eine Messung der schwachen Ladung des Protons mit einer Genauigkeit von 1,9 % erreicht werden. Die paritätsverletzende Asymmetrie der elastischen Elektron-Proton-Streuung gewährt dabei den experimentellen Zugang zur schwachen Ladung des Protons. Das Projekt befindet sich gegenwärtig in Vorbereitung, die Messung wird am neuen Elektronenbeschleuniger MESA in Mainz durchgeführt werden. Anhand des Posters werden das experimentelle Konzept, Berechnungen zur erreichbaren Präzision bei der Bestimmung des elektroschwachen Mischungswinkels, sowie Simulationen mit Geant4, welche durchgeführt werden, um mögliche Detektorkonfigurationen zu erforschen, vorgestellt.

HK 27.10 Di 16:45 F Foyer

Superconducting Shielding for a Transversely Polarized Target at PANDA — •Alaa Dbeyssi[1], Heybat Ahmadi[1,2], Samer Ahmed[1,2], Alexander Aycock[1,2], Luigi Capozza[1], Bertold Fröhlich[1,2], Phillip Grasemann[1,2], Sebastian Haasler[1,2], David Izard[1], Dmitry Khaneft[1,2], Jörg Köhler[1,2], Frank Maas[1,2,3], Maria Carmen Mora Espí[1], Oliver Noll[1,2], David Rodríguez Piñeíro[1], Javier Jorge Rico[1], Sahra Wolff[1,2], Manuel Zambrana[1,2], Iris Zimmermann[1,2], and Maria Consuelo Barrantes Masot[1] — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

Time-like electromagnetic form factors of the proton can be experimentally accessible through the annihilation process of antiproton-proton into lepton pair. A transversely polarized proton target at the future PANDA experiment allows us to access the relative phase between the electric and the magnetic form factors of the proton. The first step to achieve the transverse target polarization is to study the feasibility of shielding the target region from the external 2 T longitudinal magnetic field generated by the PANDA solenoid. BSCCO-2212, a new high-temperature superconductor material, has been identified as a possible candidate to be used for shielding this external magnetic field. Tests with BSCCO-2212 at 4 K have taken place at the Helmholtz-Institut Mainz, and the first preliminary results will be reported here.

HK 27.11 Di 16:45 F Foyer

Energy Sum for the Avalanche Photo Diode readout for the Crystal Barrel calorimeter — •Sebastian Ciupka for the CBELSA/TAPS-Collaboration — Helmholtz-Instituts für Strahlen- und Kernphysik, Universität Bonn

The Crystal Barrel (CB) calorimeter at the accelerator facility ELSA in Bonn,which consists of 1320 CsI(Tl) crystals, has recently been upgraded by a new Avalanche Photo Diode (APD) crystal readout. The APD readout provides a sufficiently fast trigger signal to allow a cluster finder to be included in the first level trigger. The upgrade also presents the opportunity for a new trigger condition utilizing the energy sum of the CB-calorimeter.

A newly developed board will sum up the analogue signals of one CB segment. This board contains a 4-bit adjustable resistance per channel to allow for an individual weight for each crystal, as well as an adjustable offset, all controlled via the I^2C-Bus. Additionally an ADC allows the board to monitor the sum and the signal of individual channels and automatically calibrate the weights of all channels.

This poster presents the features of the energy sum board and its properties.

HK 27.12 Di 16:45 F Foyer

Study of the Primakoff reaction $\pi^- + \gamma \to \pi^- + \pi^0$ at COMPASS — •Julian Seyfried — TU München, Deutschland

The COMPASS experiment at CERN has measured pion-photon scattering reactions via the Primakoff effect. In these reactions, high-energetic pions scatter off virtual photons from the Coulomb field of nuclei with high atomic number. To separate Primakoff reactions from background induced by the strong interaction, a high resolution of the squared four-momentum transfer to the nucleus is essential. This places tight requirements on the accuracy of the Monte Carlo simulation and the reconstruction of the reaction. In 2012, COMPASS has recorded a large Primakoff data sample with an optimized detector setup. This sample contains the reaction $\pi^- + \gamma \to \pi^- + \pi^0$. We will present first results from an analysis of this reaction, which offers the possibility to measure the chiral anomaly.

This work was supported by the BMBF, the DFG Cluster of Excellence "Origin and Structure of the Universe" (Exc 153), the Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München.

HK 27.13 Di 16:45 F Foyer

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

The electromagnetic decay $\eta \to \pi^0 e^+ e^-$ via a virtual photon violates the C-parity and is therefore forbidden within the standard model. Higher order processes are C-convserving but highly suppressed. Hence, this η-decay is a perfect probe to test the C-parity conservation to search for physics beyond the standard model, e.g., for dark bosons. The WASA-at-COSY setup was utilized to collect a huge $pp \to pp\eta$ data set of $\approx 5 \times 10^8$ η-mesons dedicated for studies on rare and forbidden η-decays. Based on this data set the relative branching ratio can be determined with a significantly higher sensitivity than the current upper limit of 4×10^{-5} as quoted by the PDG. Preliminary results of the analysis will be presented and discussed. In a further contribution by the WASA-at-COSY collaboration recent results of the corresponding analysis based on the reaction $pd \to {}^3He\eta$ will be presented.

*Supported by FFE program of the Forschungszentrum Jülich.

HK 27.14 Di 16:45 F Foyer

First observation of Σ^0 production in proton induced reactions on a nuclear target — •Tobias Kunz and Jürgen Friese for the HADES-Collaboration — Technische Universität München, Physik Department E62

We have studied the production of neutral Σ^0 baryons in the nuclear reaction p + Nb at an incident proton energy E_{kin} = 3.5 GeV. The measurement has been performed with the HADES experiment setup at GSI, Darmstadt. $\Sigma^0 \to \Lambda^0\gamma$ decays were identified via the charged decay $\Lambda^0 \to p\pi^-$ coincident to e^+e^- pairs from external gamma conversion. Experimental details, analysis procedures and background determination are presented. An observed total of about 250 candidate events is used to determine the $\frac{\Lambda+\Sigma}{\Sigma}$ production ratio. The obtained numbers and spectra are compared to predictions from transport model calculations and are discussed in the context of thermal particle production in nuclear fireballs.

* supp. by BMBF(05P15WOFCA), GSI F&E(TMLFRG1316) and the Excellence Cluster Universe

HK 27.15 Di 16:45 F Foyer

Flow at SIS using the Scalar product method — •Mathilde Himmelreich for the HADES-Collaboration — Goethe-Universität Frankfurt

Collective flow phenomena are a sensitive probe of hot and dense matter created in relativistic heavy-ion collisions. The analysis of this phenomena depends on an accurate calculation of the reaction plane. In this contribution we compare two different procedures with focus on achievable resolution for the reconstruction of the reaction plane in Au-Au collisions at 1.23 AGeV recorded with HADES: event plane and scalar product method. The latter permits an event-by-event correction of the event plane and the possibility to examine possible dependencies of its resolution. We show a comparative study between the two approaches to evaluate the influence of systematic effects as a function of centrality, efficiency and rapidity. For this purpose we analysed the directed and elliptic flow (v_1 and v_2) of protons and charged pions using simulations and HADES data taken in April 2012.

This work has been supported by BMBF (05P15RFFCA) and GSI.

HK 27.16 Di 16:45 F Foyer

Systematic Studies of the Peak Extraction of η Mesons with the ALICE PHOS — •Andrea Hornung for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

ALICE, the dedicated heavy-ion experiment at the LHC, investigates the properties of the quark-gluon plasma. In the experiment, the measurement of neutral mesons (π^0, η) in the calorimeters complements measurements of charged particles in the central barrel. In order to interpret the measurements of particle production in heavy-ion collisions, particle production in pp collisions is studied. Furthermore, particle production in pp provides information about the initial pQCD processes in the collision.

The PHOS detector, one of the electromagnetic calorimeters of the experiment, measures the position and energy of photons and therefore allows for the reconstruction of the η meson via its two-photon decay channel.

In this poster, the status of the analysis of η mesons produced in PHOS-triggered pp collisions at $\sqrt{s}$ = 8 TeV with the ALICE PHOS will be presented. A systematic study of the peak-extraction method and its systematic uncertainties will be discussed in detail.

Supported by BMBF and the Helmholtz Association.

HK 27.17 Di 16:45 F Foyer

Quality Assurance of π^0 Measurements with the ALICE EMCal — •Joshua Koenig for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

ALICE, as the dedicated heavy-ion experiment at the LHC, is designed to investigate the properties of the quark-gluon plasma (QGP), that is believed to be produced in the Pb-Pb collision system at high center of mass energies. The suppression of neutral pion (π^0) production in Pb-Pb collisions compared to pp collisions reveals information about energy loss mechanisms in the QGP.

The EMCal detector, one of the electromagnetic calorimeters of the experiment, measures the energy and position of photons and therewith allows to reconstruct neutral pions via their two photon decay channel.

In this poster the status of an analysis of π^0 in Pb-Pb collisions at $\sqrt{s_{\mathrm{nn}}}$ = 5.02 TeV with the EMCal will be presented. The determination of the data quality, focusing on the detector channels, and the extraction of the raw π^0 yield will be discussed in detail.

Supported by BMBF and the Helmholtz Association.

HK 27.18 Di 16:45 F Foyer

Electric conductivity of a hadron gas — •Jan Hammelmann[1,2], Jean-Bernard Rose[1,2], Juan M. Torres-Rincon[2], and Hannah Petersen[1,2,3] — [1]Johann Wolfgang Goethe Universität Frankfurt — [2]Frankfurt Institute for Advanced Studies — [3]GSI Helmholzzentrum für Schwerionenforschung

A numerical calculation of the electric conductivity of a hadron gas is presented using the hadronic transport approach SMASH (Simulating Many Accelerated Strongly-interacting Hadrons).

Transport coefficients are important properties of matter and a necessary input for dissipative fluid dynamics. They can be calculated analytically for a simplified setup e.g a pion gas. For more realistic systems like a full hadronic gas, it is only feasible to calculate the electric conductivity numerically.

As a first step towards the calculation of the electric conductivity of a full hadronic gas, a pion box with periodic boundary conditions is initialized within SMASH and extract the electric conductivity with the Green-Kubo formalism to compare it to previous results.

HK 27.19 Di 16:45 F Foyer

Monte-Carlo studies of the trigger efficiency of the ALICE-PHOS detector — •Alexej Kraiker for the ALICE-Collaboration — Institut für Kernphysik, Goethe Universität Frankfurt

The ALICE experiment at the LHC investigates the properties of the Quark-Gluon-Plasma (QGP). Various properties of the QGP can be studied by comparing the production of neutral mesons in Pb-Pb and pp collisions.

In ALICE, π^0 and η mesons are reconstructed via their two photon decay channel. The decay photons are measured with the calorimeters of the experiment EMCal, DCal and PHOS. In the experiment the measurements of neutral mesons facilitate triggered data to increase the significance of the signal. To normalize the triggered data the trigger efficiency of the trigger needs to be determined.

The poster presents a simulation of the high energy trigger of the PHOS-detector to determine the trigger efficiency. The π^0 trigger efficiency is compared with measured data, and predictions for the η mesons trigger efficiency are presented.

HK 27.20 Di 16:45 F Foyer

Low-Momentum Corrections of the ALICE TPC dE/dx-Signal — •Matthias Kleiner for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The Time Projection Chamber (TPC) is the main tracking and particle identification detector of the ALICE experiment at the CERN LHC. At momenta below 300 MeV/c the TPC dE/dx signal shows a deviation from the expected behavior as described by the Bethe-Bloch formula.

Three different correction methods for the calculation of the TPC dE/dx signal for electrons and pions are tested. The quality of the corrections is evaluated by their effects on the mean TPC dE/dx signal, the relative resolution and the separation power. Potential reasons for the deviation from the expected behavior and the corrected dE/dx signals will be presented.

HK 27.21 Di 16:45 F Foyer

Measurement of Neutral Pions in pp collisions at $\sqrt{s}$ = 5.02 TeV with the ALICE DCAL. — •Adrian Mechler for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment investigates the properties of the quark-gluon plasma (QGP) which is believed to be produced in Pb-Pb collisions at high collision energies. Hadron production measurements in pp collisions provide information about particle production through QCD processes. Furthermore, they provide an important baseline for heavy-ion collisions.

This analysis focuses on the measurement of neutral pions (π^0) which are reconstructed via their dominant two photon decay. In the ALICE experiment, the calorimeters are used to measure the position and energy of these photons: During the long shutdown one (LS1) the DCAL calorimeter has been added to the central barrel of the experiment and complements measurements by the EMCal and PHOS detectors.

We will present the status of an ongoing π^0 analysis in pp collisions at $\sqrt{s}$=5.02 TeV with the DCAL calorimeter. Different analysis steps such as the Bad Channel Map and yield extraction will be discussed. Supported by BMBF and the Helmholtz Association.

HK 27.22 Di 16:45 F Foyer

Lambda - Proton Correlation in Pion-Induced Reactions at 1.7 GeV/c — •Steffen Maurus[1,2] and Laura Fabbietti[1,2] for the HADES-Collaboration — [1]Physik Department, TUM, Garching, Germany — [2]Excellence Cluster "Universe", Garching, Germany

World data for elastic Λ - proton scattering over a wide range of Λ momenta are quite scarce. In order to provide a better theoretical description, new constraints to improve the parametrization of cross-section is needed.
In this context the inclusive Λ momenta spectrum aside with the angular correlation between proton and Λ is studied in pion-nucleon reactions (π^- + A, A = C, W) at p_{π^-} = 1.7 GeV/c with the HADES detector at GSI.
After the Λ has been produced, it interacts with the surrounding nucleons and eventually scattering occurs. The latter can be characterized by a large relative momenta between the Λ and the protons, allowing us to investigate the short distance interactions. We will report on the analysis of the collected statistics and comparison to transport model to test the sensitivity of the data to different assumption on the short range lambda-nucleon interaction.
∗ supported by BMBF 05P15WOFCA

HK 27.23 Di 16:45 F Foyer

Monte Carlo Studies of the Background in Dielectron Measurements with ALICE — •Alexander Michalik — Institut für Kernphysik, Goethe Universität Frankfurt

The major purpose of the ALICE experiment at the LHC is to explore the deconfined strongly interacting matter, the Quark-Gluon Plasma (QGP), that is formed in ultra-relativistic heavy-ion collisions. Since leptons are produced throughout all collision stages and do not experience any strong interactions with the medium, they are an ideal probe to study the properties of the QGP. However, dielectrons are a rare probe and therefore it is crucial to estimate the background of the signal to a high precision. Contributions to this background come from mis-identified hadrons and from electron-positron pairs from conversions in the detector material. In this poster we discuss the correlated and uncorrelated background and show their impact on the subtracted signal facilitating a full Monte Carlo simulation.

HK 27.24 Di 16:45 F Foyer

Performance studies for J/ψ measurements in p+A collisions with CBM — •Daniel Giang for the CBM-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The CBM experiment at FAIR aims to explore the QCD phase diagram at moderate temperatures and high net-baryon densities. The J/ψ meson is considered to be one of the most important observables for the quark-gluon plasma (QGP), since the potential that binds the $c\bar{c}$-pair can be screened by the presence of free color charges. Besides QGP effects, a part of the suppression happens because of cold nuclear matter effects. We can analyze the contribution of these effects in p+A collisions, where no QGP is expected.
In this work we present a simulation of the J/ψ production in p+Au collision to study the performance of the detector setup in the CBM experiment. Additionally, we will discuss fast simulation methods which allow to generate huge amounts of events, needed to produce a significant J/ψ signal.

Supported by the German BMBF-grant 05P15RFFC1

HK 27.25 Di 16:45 F Foyer

Lorentz Invariance of a Hadronic Transport Approach — •Justin Mohs[1,3], Dmytro Oliinychenko[1,2], and Hannah Petersen[1,3,4] — [1]Frankfurt Institute for Advanced Studies — [2]Bogolyubov Institute for Theoretical Physics — [3]Institute for Theoretical Physics — [4]GSI Helmholtzzentrum für Schwerionenforschung

In heavy ion collisions a relativistic description is essential in order to achieve correct results, since relativistic effects, such as time dilation or length contraction, grow with increasing velocities.

At low beam energies hadron transport approaches are successfully employed to describe the dynamical evolution of heavy ion reactions. Even though the underlying Boltzmann equation is covariant, it is known, that the geometric collision criterion used in the numerical solution introduces non-local interactions. In this work, a newly developed transport approach, SMASH (Simulating Many Accelerated Strongly-interacting Hadrons) is tested for Lorentz invariance.

The collision rates of these transport calculations in different observational reference frames are compared in order to observe a possible frame dependency in the calculation. A procedure of performing Lorentz boosts to different frames as well as the results for several initial and boundary conditions is presented. From these results, conclusions about the conditions under which the calculations are Lorentz invariant can be drawn.

HK 27.26 Di 16:45 F Foyer

Monte Carlo Studies of Collision Energy Dependence of π^0-Production in pp Collisions — •Leonard Brandenburg — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment at the LHC is designed to investigate the properties of the quark-gluon plasma (QGP), which is believed to be produced in Pb-Pb collisions at high center-of-mass energies. Studies on the production of neutral mesons in Pb-Pb collisions use particle production measurements in pp collisions as an important baseline.
Monte Carlo event generators are essential tools used in detector design and experimental analysis. Since not all aspects of these simulations can be derived from first principles, they require tuning of their parameters in order to accurately describe experimental data. Ideally, these tuned event generators should match experimental data over a wide range of center-of-mass energies.
In this poster, the dependence of π^0 production in pp collisions on center-of-mass energy will be discussed using the 4C, 4Cx and Monash 2013 tunes of the PYTHIA 8 event generator. Furthermore the results will be compared to experimental data at center-of-mass energies from 62.4 GeV to 7 TeV.

HK 27.27 Di 16:45 F Foyer

π^0 and η production in π^- induced reactions with HADES* — •Jan-Hendrik Otto for the HADES-Collaboration — Justus Liebig Universität Gießen

The High Acceptance DiElectron Spectrometer (HADES), located at GSI, Darmstadt, Germany, is build to study properties of baryon rich matter and particle and resonance production in elementary collisions.

In the HADES beam time in 2014 several pion induced reactions have been investigated using a negatively charged pion beam and either a Polyethylene, Carbon or Tungsten target. Those systems have been measured at different energies provided by the SIS18 accelerator.

In this contribution we present the status of the reconstruction of π^0 and η mesons using the photon conversion method in pion induced reactions for various pion beam momentum ranging from 0.69GeV/c to 1.7GeV/c. Further we aim at extracting a transverse momentum spectrum of photons and to use it as a reference spectrum for $Au+Au$ collisions. This analysis will bring insides to our understanding of the contribution of photons from Dalitz decays of baryons to the so called 'direct' photon spectra extracted from $Au+Au$ collisions.

(*supported by BMBF grants 05P15RGFCA)

HK 27.28 Di 16:45 F Foyer

Femtoscopy studies using the EPOS and UrQMD models — •Dimitar Mihaylov, Laura Fabbietti, Olliver Arnold, and Ante Bilandzic — Technische Universität München, James-Franck-Straße, 85748, Garching, Germany

Femtoscopy is a method used to investigate particle correlations by using the experimentally accessible two-particle momentum correlation function. This function can be mathematically obtained by integrating the product of the source function and the two-particle wave function.

Currently there is a lot of focus on investigating hyperon-nucleon interactions using experimental data collected by ALICE at LHC and by HADES at GSI. The EPOS and UrQMD transport models can be used to describe the emission source at high and low collision energies respectively. Those models can be tested by comparing their predicted correlation function to the experimentally obtained one for a known interaction, e.g. pp. If the determination of the source is proven robust one could rely on the model and investigate the interaction potential for particle pairs which do not have well determined scattering parameters, e.g. pΛ. Furthermore having the source fixed at both high and low energies will allow for a direct comparison of the interaction at different energies. However the EPOS model predicts very small source-radii which may break-down the standardly used asymptotic approximation. This motivated the development of a framework work-

ing with a numerical evaluation of the wave-function.

This work is supported by BMBF-FSP 202 and the Excellence Cluster Universe.

HK 27.29 Di 16:45 F Foyer

Towards Laser Spectroscopy of Boron-8 — •Bernhard Maass[1], Peter Müller[2], Jason Clark[2], Christian Gorges[1], Simon Kaufmann[1], Kristian König[1], Jörg Krämer[1], Anthony Levand[2], Rodney Orford[2], Rodolfo Sánchez[3], Guy Savard[2], Felix Sommer[1], and Wilfried Nörtershäuser[1] — [1]IKP,TU Darmstadt, DE — [2]ANL, Chicago, IL, USA — [3]GSI Darmstadt, DE

The BOR8 experiment aims at the determination of the nuclear charge radius of boron-8 with high-resolution laser spectroscopy. ^{8}B is perhaps the best candidate of a nucleus exhibiting an extended proton wave-function or one-proton-halo. The charge radius, which is directly correlated with the extent of the proton wave function, can be extracted from the measured isotope shift along the boron isotopic chain. Atomic theory calculations of the five-electron system, which were recently carried out, pave the way for targeting neutral boron atoms, whose spectroscopic properties are well suited for such measurements. In-flight production and preparation of sufficient yields of ^{8}B ions at low energies are provided by the Argonne Tandem Linac Accelerator System (ATLAS) at Argonne National Laboratory (ANL). In a first off-line experiment, the isotope shift of the stable isotopes ^{10,11}B have been measured with resonance ionization mass spectrometry. This delivers a valuable test not only of atomic theory, but also of experimental equipment which will later be used at ANL.

This work is supported by the U.S. DOE, Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH1135, and by the Deutsche Forschungsgemeinschaft through Grant SFB 1245.

HK 27.30 Di 16:45 F Foyer

The multi-detector array ELIADE at ELI-NP — •Julius Wilhelmy[1], C. A. Ur[2], A. Zilges[1], N. Pietralla[3], J. Beller[3], B. Boisdefre[2], M. O. Cernaianu[2], B. Löher[4], C. Matei[2], G. Pascovici[3], C. Petcu[2], C. Romig[3], D. Savran[5], G. Suliman[2], E. Udup[2], and V. Werner[3] — [1]Institute for Nuclear Physics, University of Cologne — [2]ELI-NP, "Horia-Hulubei" National Institute for Physics and Nuclear Engineering, Bucharest, Romania — [3]Institute for Nuclear Physics, University of Darmstadt — [4]ExtreMe Matter Institute, GSI, Darmstadt — [5]University of Mainz

The new laser-based Inverse Compton Scattering gamma-beam system at ELI-NP (Extreme Light Infrastructure - Nuclear Physics) in Bucharest will provide extremely high intensities at very narrow bandwidths. The Nuclear Resonance Fluorescence (NRF) technique gives access to several experimental quantities like excitation energies, level widths, γ-decay branching ratios, spin quantum numbers, and parities in a model independent way. The main detection system for NRF experiments is the multi-detector array **ELIADE** (**ELI**-NP **A**rray of **DE**tectors). It is composed of high-purity Ge detectors and large volume $LaBr_3$ scintillator detectors, providing both, high efficiency and very good energy resolution. An overview of the experimental setup and its current status will be presented.

Supported by the Project Extreme Light Infrastructure - Nuclear Physics (ELI-NP) - co-financed by the Romanian Government, the European Union through the European Regional Development Fund and the BMBF (05P2015/ELI-NP).

HK 27.31 Di 16:45 F Foyer

Confined β-soft Rotor Modell als Spin-Meter von superdeformierten Banden für ^{194}Hg — •Andreas Weber, Tobias Beck, Andreas Krugmann, Norbert Pietralla und Michael Reese — Institut für Kernphysik, TU Darmstadt

Geometrische Superdeformation wurde bei vielen schweren Kernen beobachtet. Sie äußert sich in dem Auftreten von Rotationsbanden angeregter Zustände im Termschema. Durch deren komplexe Zerfallsverzweigungen ist bis auf wenige Ausnahmen eine eindeutige Zuweisung von Drehimpulsquantenzahlen zu diesen Zuständen nicht möglich und geschieht oft über einen Vergleich zum einfachen Modell des Starren Rotors. Das Confined β-soft (CBS) Rotor Modell [1] liefert analytische Lösungen des Bohr-Hamiltonians und ist dem Starren Rotor in der Genauigkeit seiner Vorhersagen für relative Anregungsenergien überlegen. Das CBS Rotor Modell wird hier dazu verwendet, um Zuständen der Rotationsbanden des Kerns ^{194}Hg Drehimpulsquantenzahlen zuzuordnen und die (noch unbekannten) Anregungsenergien der jeweiligen Bandenköpfe vorherzusagen.

[1] N. Pietralla and O.M. Gorbachenko, PRC 70,011304 (2004).

HK 27.32 Di 16:45 F Foyer

Lifetimes of 2_1^+,4_1^+ states of ^{148}Ce from EXILL&FATIMA — •Pavlos Koseoglou[1], V. Werner[1,2], N. Pietralla[1], S. Ilieva[1], M. Thürauf[1], C. Bernards[2], A. Blanc[3], A.M. Bruce[4], R.B. Cakirli[5], N. Cooper[2], G. de France[6], M. Jentschel[3], J. Jolie[7], U. Koester[3], T. Kröll[1], P. Mutti[3], Z. Patel[8], V. Paziy[9], Zs. Podolyak[8], P. H. Regan[8,10], J.-M. Régis[7], O.J. Roberts[4], N. Saed-Samii[7], G.S. Simpson[11], T. Soldner[3], C. A. Ur[12], W. Urban[3], D. Wilmsen[7], and E. Wilson[8] — [1]IKP TU-Darmstadt, Germany — [2]Yale University, USA — [3]ILL Grenoble, France — [4]University of Brighton, England — [5]MPIK Heidelberg, Germany — [6]GANIL Caen, France — [7]IKP University of Cologne, Germany — [8]University of Surrey, England — [9]Universidad Complutense, Spain — [10]National Physical Laboratory, UK — [11]LPSC Grenoble, France — [12]INFN Legnaro, Italy

An update on the analysis of the EXILL&FATIMA data on ^{148}Ce will be given. ^{148}Ce lies on the down boundaries of a shape phase transition region of the even-even N=90 isotones with Z=60-66. The $B_{4/2}$ value will point out the behaviour of the phase transition evolution. A first estimation will be presented and it will be connected to a new CPS called X(4).^{235}U and ^{241}Pu fission fragments were measured by a mixed spectrometer consisting of Ge and $LaBr_3$(Ce)-scintillator detectors at the ILL. Lifetimes in the ps region are extracted with the slope and the General Centroid Difference method. This kind of analysis can serve as preparation for the FATIMA experiments at FAIR. Supported by HGS-HIRe, US DOE under Grant No. DE-FG02-91ER-40609 and BMBF grant No. 05P15RDFN1.

HK 27.33 Di 16:45 F Foyer

Experimente zur Einschränkung von Modellen für elektroschwache Prozesse — •Philipp Christian Ries, Joachim Enders, Udo Gayer, Peter von Neumann-Cosel, Norbert Pietralla und Volker Werner — Institut für Kernphysik, Technische Universität Darmstadt, 64289 Darmstadt

In kommenden Experimenten am Darmstädter supraleitenden Elektronenlinearbeschleuniger S-DALINAC sollen zwei Aspekte der schwachen Wechselwirkung in der Kern- und Astrophysik mit Hilfe von Elektronenstreuung untersucht werden. Zum einen sollen Parameter zur Berechnung der Übergangsmatrixelemente eines möglichen neutrinolosen doppelten Betazerfall ($0\nu\beta\beta$) von ^{76}Ge zu ^{76}Se eingegrenzt werden. Hierfür werden die Monopolübergange vom ersten angeregten 0^+-Zustand zum 0^+-Grundzustand in beiden Isotopen in Hinblick auf "Shape Mixing", welches den $0\nu\beta\beta$-Zerfall in den angeregten 0^+-Zustand in ^{76}Se verstärken würde, vermessen.

Zum anderen sollen Formfaktoren der Grundzustände und ersten angeregten Zustände von ^{129}Xe und ^{131}Xe bestimmt werden. Diese sollen für theoretische Betrachtungen der Wechselwirkungen von schwach wechselwirkenden schweren Teilchen (WIMPs), die als Kandidaten für Dunkle Materie gelten, dienen. Falls die Wechselwirkung zwischen WIMPs und Nukleonen spinabhängig wäre, wird für die Xenonisotope ungerader Massezahl, die als Detektormaterial in der XENON-Kollaboration eingesetzt werden, ein erheblicher Beitrag durch inelastische Streuung erwartet.

*Gefördert durch die DFG im Rahmen des SFB 1245

HK 27.34 Di 16:45 F Foyer

Pygmy-Resonanz im schweren deformierten Kern ^{154}Sm aus polarisierter Protonenstreuung unter 0°.* — •Andreas Krugmann[1], Sergej Bassauer[1], Isabelle Brandherm[1], Dirk Martin[1], Peter von Neumann-Cosel[1], Norbert Pietralla[1], Vladimir Ponomarev[1] und Atsushi Tamii[2] — [1]Insitut für Kernphysik, TU Darmstadt — [2]Research Center for Nuclear Research, Osaka University

Am RCNP in Osaka wurde ein Protonenstreuexperiment mit polarisierten Protonen am deformierten Kern ^{154}Sm unter extremen Vorwärtswinkeln inklusive 0° durchgeführt. Mit Hilfe von Polarisationstransferobservablen konnte eine Trennung des Spinflipanteils und des Nicht-Spinflipanteils und damit eine Trennung von E1 und M1 Anteilen am gesamten Wirkungsquerschnitt vorgenommen werden. Im Falle der elektrischen Dipolstärke konnte zum ersten Mal die Pygmy-Dipolresonanz in einem schweren deformierten Kern identifiziert werden. Eine Doppelstruktur mit Maxima bei 6 und 8 MeV wurde beobachtet. Als mögliche Interpretation wird eine Deformationsaufspaltung aufgrund der Erhaltung der K-Quantenzahl analog zur Dipolriesenresonanz gegeben. Der Photoabsorptionsquerschnitt zeigt ein deutlich größeres K=1/K=0 Verhältnis im Bereich der Dipolriesenresonanz als

frühere (γ,xn) Experimente [1].

[1] P. Carlos et al., Nucl. Phys. A **225**, 171 (1974).

* Gefördert durch die DFG im Rahmen des SFB 1245.

HK 27.35 Di 16:45 F Foyer

Verbesserung der Energie- und Zeitauflösung des QCLAM-Spektrometers — •Antonio D'Alessio, Peter von Neumann-Cosel, Norbert Pietralla, Maxim Singer und Volker Werner — Institut für Kernphysik, TU Darmstadt

Der Superconducting-DArmstadt-LINear-ACcelerator (S-DALINAC) befindet sich momentan in einer Umbauphase und wird zu einem Energy Recovery LINAC umgerüstet. In diesem Zuge wird ebenfalls die Energieauflösung des Beschleunigers verbessert. In der jetzigen Konfiguration wäre das QCLAM-Magnet-Spektrometer das limitierende Element in der Energieauflösung bei zukünftigen Experimenten. Aus diesem Grund wird die Elektronik und das Detektorsystem des Spektrometers weiter entwickelt.

Die Vieldraht-Driftkammern des Detektorsystem werden von einem Argon-Isobutan Gasgemisch auf ein Argon-Kohlenstoffdioxid Gasgemisch umgestellt, hiermit erreicht man eine geringere Diffusion der Elektronenlawine innerhalb des Gases und somit eine bessere Zeitauflösung. Ebenfalls werden nun alle Drähte als Zähldrähte genutzt.

Gefördert wird diese Arbeit durch das Graduierten-Kolleg GRK 2128 "AccelencE„ und den Sonderfoschungsbereich SFB 1245.

HK 27.36 Di 16:45 F Foyer

Experimental study of nuclear vorticity with the ^{12}C(e,e'γ) reaction at the QCLAM electron spectrometer* — •Tobias Klaus, Sergej Bassauer, Andreas Krugmann, Peter von Neumann-Cosel, Norbert Pietralla, Vladimir Ponomarev, Maxim Singer, and Jochen Wambach — Institut für Kernphysik, TU Darmstadt

Experiments of inelastically scattered electrons in coincidence with real photons have the big advantage that the probe is purely electromagnetic and hence allow for nuclear structure studies of highest precision. We developed a setup for electron-γ-ray coincidence spectroscopy at the QCLAM electron spectrometer at the S-DALINAC. The first experiment is a study of γ-decay angular distributions in ^{12}C in order to infer the vorticity of nuclear velocity fields in low-lying exited states. We present the experimental setup and discuss theoretical predictions for the velocity field distributions for the 2^+_1 and 3^-_1 state. The $1^+_{T=1}$ state at 15.11 MeV will be used to calibrate the setup for further experimental campaigns.

*Supported by the DFG within the SFB 1245.

HK 27.37 Di 16:45 F Foyer

A silicon vertex tracker for experiments with light particles at SAMURAI — •Florian Dufter, Roman Gernhäuser, Laura Fabbietti, Sebastian Reichert, Christian Berner, and Lukas Werner for the SAMURAI19-Collaboration — Technische Universität München

The tetraneutron has attracted a lot of experimental and theoretical attention in recent years. The observation of a 4-neutron ground state resonance could deliver information about a three nucleons interaction and may contribute to further understanding of the equation of state in neutron stars. The ^4n ground state resonance is created by using the ^8He(p,pα)^4n knock-out reaction. Two layers of silicon detectors determine the position of the reaction vertex in a liquid hydrogen target. The energy of the resonance is determined by the full kinematic reconstruction of the scattered charged particles with the SAMURAI spectrometer at the RIKEN facility in Japan. We developed a new setup of highly segmented 100 μm thin silicon detectors for vertex reconstruction in a 5 cm LH_2 target. The detector concept, its implementation and tests of the first prototypes as well as a GEANT4 simulation of the expected performance will be presented. This work is supported by the SFB1245 of TU Darmstadt (DFG) and the DFG Cluster of Excellence "Origin and Structure of the Universe".

HK 27.38 Di 16:45 F Foyer

Investigations of ^{55}Fe energy spectra in Ne-CO_2 gas mixtures for GEM detectors — •Viktor Ratza, Markus Ball, Mathias Liebtrau, and Bernhard Ketzer for the ALICE-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, DE

With the planned upgrade of the ALICE Time Projection Chamber the current multi-wire proportional chambers will be replaced by a Gas Electron Multiplier (GEM) - based technology in order to allow for a continuous operation at high interaction rates up to 50 kHz. A stack of four GEM stages was chosen to achieve a suppression of the ion backflow below 1%. At the same time an energy resolution of σ/E lower than 12% has to be maintained for ^{55}Fe in Ne-CO_2-N_2 (90-10-5) at a total gain of 2000. This requires a reliable determination of the width of the photopeak.

Typically a simple Gaussian is fitted to the ^{55}Fe K_α-peak in order to determine the enery resolution. However, the obtained fit is strongly biased by the K_β-peak and an underlying background, resulting in a systematic shift of the estimated energy resolution. This effect can be of the order of one percentage point.

In order to obtain a more appropriate description of the energy spectrum the background was investigated in detail. Taking the K_β-peak and the underlying background into account a fit model was introduced to achieve a more realistic and consistent description of the energy spectrum and thus the energy resolution.

Supported by BMBF.

HK 27.39 Di 16:45 F Foyer

Search for double beta decay processes of ^{124}Xe with XENON100 and XENON1T — •Alexander Fieguth for the XENON-Collaboration — Institut fuer Kernpyhsik WWU, Muenster, Deutschland

Driven by the search for dark matter particles the XENON collaboration installed its next stage multi-ton experiment XENON1T, which will probe the spin-dependent and spin-independent-WIMP-nucleon cross section, where for the latter a sensitivity down to 1.6x10^{-47}cm^2 will be reached. Adding to its main purpose different particle physics topics can be addressed. One example are double beta decay processes of the isotope ^{124}Xe. It is expected to decay via two-neutrino double electron capture (2νECEC). Due to its Q-value of 2864keV the positron including processes 2vECβ^+ and 2$\nu\beta^+\beta^+$ are also allowed. With its fiducial mass of one ton, XENON1T will be the most sensitive detector for these decays to date and detection the 2vECEC and 2vECβ+ decays is within reach providing information on nuclear matrix element (NME) models. Within this work the search for 2νECEC has been carried out on 225 live days of XENON100 data setting a lower limit of 6.5x10^{20}yr@90% C.I. for the half-life of this decay. Despite of not being competitive with the best limit >4.7x10^{21}yr set by the XMASS-I experiment, it supersedes a published external analysis of this data. Moreover the possibilities of the running XENON1T experiment are studied by a simulation, which shows that it will be the most sensitive experiment for this decay channel. This work is supported by BMBF under contract number 05A14PM1 and DFG(GRK 2149).

HK 27.40 Di 16:45 F Foyer

Determination of the tritium Q-value at the KATRIN experiment — •Rudolf Sack for the KATRIN-Collaboration — WWU Münster

KATRIN is a next generation tritium $\beta-$decay experiment which will allow a model independent investigation of the sub eV neutrino mass scale. With an estimated sensitivity of 0.2 eV/c^2 (90 % C.L.) it will improve the sensitivity on direct neutrino mass measurements by one order of magnitude. To reach this goal, it is important to understand the systematic effects of this experiment. All systematic uncertainties combined must not exceed an uncertainty of 0.017 eV^2/c^4 on m^2_ν. The measurement of the Q-value of tritium $\beta-$decay, which is closely related to the endpoint E_0 of the electron energy spectrum, has great potential to check the whole experiment for systematic effects. The value obtained at KATRIN can be compared to results of Penning trap experiments, performed e.g. EG Meyers et al. at Florida SU, who published this value with an uncertainty of only 70 meV. This will allow us to check the systematics of the experiment, assuming that we can control our energy scale at this level. The estimated statistical error will be $\Delta E_0 = 2-3$ meV after the full three years of measurement time.

This work is supported by the Research and Training Group GRK2149.

HK 27.41 Di 16:45 F Foyer

The neutron lifetime experiment τSPECT — •Kim Ross[1], Marcus Beck[1], Christopher Geppert[2], Jan Haack[1], Werner Heil[1], Jan Kahlenberg[1], Jan Karch[1], Sergei Karpuk[2], Yuri Sobolev[2], and Norbert Trautmann[2] — [1]Institut für Physik, Johannes Gutenberg-Universität Mainz — [2]Institut für Kernchemie, Johannes Gutenberg-Universität Mainz

The decay of the free neutron into a proton, electron, and antineutrino

is the prototype semileptonic weak decay and is the simplest example of nuclear beta decay. The present "neutron lifetime puzzle" shows that some subtle and not understood effects in some of the experiments does not allow to quote a rather complete systematic confidence interval. Rather than relying on neutron reflection from a material wall, where neutron up-scattering and capture cause significant wall losses, magnetically trapped neutrons do not interact with matter during the storage interval. That is the obvious appeal to the use of magnetic and gravitational confinement, where, at least in principle, the dynamics of the neutron-trap interaction is straightforward. The τSPECT spectrometer provides a 3D magnetic storage of ultracold neutrons (UCN) up to 60 neV and is presently setup at the pulsed UCN source at TRIGA Mainz. By measuring both the decay protons and the surviving neutrons, an accurate neutron lifetime measurement with $\delta t \approx 1$ s is envisaged for phase I of this project.

This poster discusses the current status of τSPECT.

HK 27.42 Di 16:45 F Foyer

Implementation and test of a setting generator for the GSI fragment separator FRS in the LHC Software Architecture LSA — •Jan-Paul Alexander Hucka[1], Joachim Enders[1], Stephane Pietri[2], Helmut Weick[2], David Ondreka[2], Hanno Hüther[2], Jutta FItzek[2], and Holger Liebermann[2] — [1]Institut für Kernphysik, TU Darmstadt — [2]GSI Helmholtzzentrum für Schwerionenforschung

At the GSI facility the LSA [1] framework from CERN is used to implement a new control system for accelerators and beam transfers. This was already completed and tested for the SIS18 accelerator. The implementation of experimental rings such as CRYRING and ESR is currently under development. In addition, the Fragmentseparator FRS [2] and - in a later stage - also the superconducting Fragmentseparator S-FRS at FAIR will be controlled within this framework.

The challenge posed by the implementation of the control system for the FRS arises from the interaction of the beam with matter in the beamline and the beam*s associated energy loss. This energy loss will be determined using input from ATIMA [3] and has been included into the code of the LSA framework. The implemented setting generator was simulated and benchmarked by comparison to results of earlier measurements.

Work supported in part by the state of Hesse (LOEWE center HIC for FAIR) and BMBF (05P15RDFN1). [1] M. Lamont et al., LHC Project Note 368 [2] H. Geissel et al., NIM B 70, 286 (1992) [3] H. Weick et al., NIM B 164/165 (2000) 168.

HK 27.43 Di 16:45 F Foyer

RF Tuning of the Coupled FRANZ RFQ - IH-DTL — •Ali Almomani and Ulrich Ratzinger — IAP - Frankfurt University

The neutron beam at the FRANZ facility will be produced by the 7Li(p,n)7Be reaction using an intense 2 MeV proton beam. A coupled 4-Rod-type RFQ and a 8 gap interdigital H-type structure (IH-DTL) will be used to accelerate the protons from 120 keV to 2 MeV. This coupled RFQ - IH-DTL will be operated at 175 MHz in cw mode and it has a total length of about 2.3 m. The two structures (RFQ, IH-DTL) are internally coupled inductively, and consequently only one RF-amplifier providing a total power up to 250 kW is needed for operation. The IH-DTL is RF tuned together with an Al-RFQ model, before final IH installation in the FRANZ cave, while the original RFQ was already installed in the beam line. After RF power and beam tests the coupled structure will be installed and continued with RF and beam. This paper will be focused on the RF tuning process and the main results will be presented.

HK 27.44 Di 16:45 F Foyer

Status of the modulated 3 MeV 325 MHz Ladder-RFQ — •Maximilian Schütt, Marc Syha, Marcus Obermayer, and Ulrich Ratzinger — Institut für Angewandte Physik, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

Based on the positive results of the unmodulated 325 MHz Ladder-RFQ from 2013 to 2016, we develop a modulated 3.3 m Ladder-RFQ. The unmodulated Ladder-RFQ features a very constant voltage along the axis. It could withstand more than 3 times the operating power of which is needed in operation at a pulse length of 200 micro seconds. That corresponds to a Kilpatrick factor of 3.

The 325 MHz RFQ is designed to accelerate protons from 95 keV to 3.0 MeV according to the design parameters of the p-linac at FAIR. This particularly high frequency for a 4-Rod type RFQ creates difficulties, which are challenging in developing an adequate cavity. The results of the unmodulated prototype have shown, that the Ladder-RFQ is a suitable candidate for that frequency.

Inspired by the successful rf power test, the nominal vane-vane voltage was increased from 80 kV to 96 kV. The basic design and tendering of the RFQ has been successfully completed in 2016. Electromagnetic simulations of a modulated full structure, especially in terms of field-flatness and frequency tuning, will be shown. Furthermore, the mechanical design, which includes a direct cooling of the structure for duty cycles up to about 5%, will be discussed.

HK 27.45 Di 16:45 F Foyer

Beam Dynamics Simulations for the SC CW Heavy Ion Linac at GSI — •Malte Schwarz[1], Holger Podlech[1], Kurt Aulenbacher[3], Winfried Barth[2,3], Markus Basten[1], Marco Busch[1], Florian Dziuba[1,3], Viktor Gettmann[2,3], Manuel Heilmann[2], Sascha Mickat[2,3], Maksym Miski-Oglu[2,3], Ulrich Ratzinger[1], Rudolf Tiede[1], and Stepan Yaramyshev[2] — [1]IAP, Goethe-Universität, Frankfurt am Main — [2]GSI Helmholtzzentrum, Darmstadt — [3]HIM Helmholtzinstitut, Mainz

For future experiments with heavy ions at the coulomb barrier within the SHE (super-heavy elements) research project a multi-stage R&D program of GSI, HIM and IAP is currently under progress. It aims at developing an energy-variable superconducting (sc) continuous wave (cw) LINAC for A/q up to 6. The beam dynamics concept is based on multicell constant-beta CH-DTL cavities. The next milestone will be the full performance test of the first LINAC section (Demonstrator) with beam, after an accomplished performance test already showed promising results. In addition, as intermediate step towards the full LINAC an Optimized Advanced Demonstrator is proposed. The corresponding simulations, mainly made with LORASR and TraceWin will be presented.

HK 27.46 Di 16:45 F Foyer

Beam Dynamics for a High Current 3 MeV, 325 MHz Ladder-RFQ — •Marc Syha, Maximilian Schütt, Marcus Obermayer, and Ulrich Ratzinger — Institut für Angewandte Physik, Goethe-Universität Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

After the successful measurements with a 0.8 m prototype a 3.3 m Ladder-RFQ is under construction at IAP, Goethe University Frankfurt. It is designed to accelerate protons from 95 keV to 3.0 MeV according to the design parameters of the p-linac at FAIR.

The development of an adequate beam dynamics was done in close collaboration with the IAP resonator design team. The Los Alamos RFQGen-code was used for the beam simulations. A constant vane curvature radius and at the same time a flat voltage distribution along the RFQ was reached by implantation of the modulated vane geometry into MWS-CST RF field simulations.

Point of reference for the beam dynamics layout are the beam dynamics designs of C. Zhang* and A. M. Lombardi**. This poster presents the simulation results with the main vane modulation parameters.

Footnotes

* Chuan Zhang, "Beam Dynamics for the FAIR Proton-Linac RFQ", IPAC 2014, Dresden ** C. Rossi et al., "The Radiofrequency Quadrupole Accelerator for the LINAC4", LINAC08, Victoria, BC, Canada

HK 27.47 Di 16:45 F Foyer

Tests of ionisation chambers for photofission experiments — •Marius Peck[1], Joachim Enders[1], Martin Freudenberger[1], Alf Göök[2], Andreas Oberstedt[3], and Stephan Oberstedt[2] — [1]Institut für Kernphysik, TU Darmstadt, Germany — [2]European Commission, JRC-IRMM, Geel, Belgium — [3]ELI-NP, Măgurele, Romania

Photofission in the barrier region suffers from relatively low cross sections. Hence, besides using intense bremsstrahlung (S-DALINAC) or monochromatic γ-ray beams (ELI-NP), significant amounts of target material needs to be placed in the beam to reach sufficient luminosity. We set up and tested a multi-stack Frisch-grid ionisation chamber and obtained angular and mass distributions as well as total kinetic energy of fission fragments in neutron-induced fission of ^{232}Th and ^{238}U.
For the measurement of the azimuthal angular distribution segmented anodes have been used.
Supported by BMBF (05P15RDENA).

HK 27.48 Di 16:45 F Foyer

Automatic Energy and Efficiency Calibration of HPGe De-

tectors — •Elena Hoemann, Jan Mayer, Mark Spieker, and Andreas Zilges — Institute for Nuclear Physics, University of Cologne

HDTV[1] is a γ-ray spectrum analyzing tool created at the University of Cologne. It is written in python and based upon the ROOT framework from CERN. This poster deals with the enhancements of HDTV. The new automation of energy calibration for HPGe detectors, which is obtained by matching literature data of the observed nuclide to the fitted peaks, will be introduced. In addition the behavior of different functions for the extrapolation of the efficiency in the high-energy range was investigated and an automatic fit to the experimental data will be presented.

Supported by the BMBF (05P2015PKEN9/ELI-NP). J.M. is supported by the Bonn-Cologne Graduate School of Physics and Astronomy.

[1] HDTV - Institut for Nuclear Physics, University of Cologne, https://gitlab.ikp.uni-koeln.de/staging/hdtv

HK 27.49 Di 16:45 F Foyer

High resolution picoamperemeters for high voltage applications — •Dimitri Schaab, Justus Rödel, Markus Ball, Reinhard Beck, and Bernhard Ketzer — Helmholtz-Institut für Strahlen- und Kernphysik, Bonn, DE

Modern tracking detectors, as the future Time Projection Chambers for ALICE and the CBELSA/TAPS experiment, are based on Micro Pattern Gaseous Detector technology. In either case, Gaseous Electron Multipliers (GEM) will be used for the amplification of primary charges. In this scope, several studies at GEM-based test detectors are done which involve current measurements down to the order of picoamperes. For this purpose, current-meters with a high-impedance op-amp are used. Since GEM-related measurements have to be performed at voltages of several kilovolts, the current-meter must be designed such that it is decoupled from any external ground potential. At the present time, they are powered by batteries and read out wirelessly in order to avoid an external ground connection. To do measurements independently of the battery lifetime, a potential-free optical power supply was developed and tested. Moreover, a fully automatic calibration station was built to calibrate the current-meters at controlled temperature conditions. Latest investigations revealed a non-negligible temperature dependence that can be compensated by software if the temperature is known. Thus, a temperature monitoring is necessary which implies a revision of the devices. At stable temperatures, the absolute precision was determined to be below 2pA.

Supported by SFB/TR16.

HK 27.50 Di 16:45 F Foyer

Konzeption eines Flüssig-Heliumtargets für Elektronenstreuexperimente — •Michaela Hilcker, Andreas Krugmann, Thorsten Kürzeder, Norbert Pietralla und Peter von Neumann-Cosel — Institut für Kernphysik, TU Darmstadt

Am Institut für Kernphysik der TU Darmstadt werden mittels hochauflösender, inelastischer Elektronenstreuung Untersuchungen der Kernstruktur bei niedrigen Impulsüberträgen durchgeführt. Das QClam-Spektrometer, eines der beiden großen Magnetspektrometer des Instituts, dient der Bestimmung des Impulses der gestreuten Elektronen.

Im Rahmen des Sonderforschungsbereich 1245 „Nuclei: From Fundamental Interaction to Structure and Stars“ ist ein Elektronenstreuexperiment bei niedrigem Impulsübertrag zur Untersuchung des ersten angeregten 0^+ Zustandes in ^{4}He geplant, da bisherige Experimente [1] stark von aktuellen „ab initio“ Rechnungen im Rahmen der chiralen EFT [2] abweichen. Um eine ausreichend gute Statistik der Messdaten in annehmbarer Messzeit erhalten zu können, ist die Verwendung von flüssigem Helium als Targetmaterial notwendig. Die Konstruktion eines geeigneten Aufbaus inklusive Heliumkryostat und einer dazu passenden neuen Streukammer werden vorgestellt.

[1] T. Walcher, Phys. Lett. B **31**, 442 (1970).
[2] S. Bacca, N. Barnea, W. Leidemann, and G. Orlandini, Phys. Rev. Lett. **110**, 042503 (2013).

Gefördert durch die DFG im Rahmen des SFB 1245.

HK 27.51 Di 16:45 F Foyer

Automatisierte Kalibrierung von NeuLAND mithilfe von kosmischen Strahlen — •Vadim Wagner[1,2], Dmytro Kresan[2] und Joachim Enders[1] — [1]TU Darmstadt, Darmstadt, Deutschland — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Deutschland

Der New Large Area Neutron Detektor (NeuLAND) wird beim zukünftigen Reactions with Relativistic Radioactive Beams (R3B) Experiment in der Facility for Antiproton and Ion Research (FAIR) die Energien von bis zu vier Neutronen gleichzeitig mithilfe von Flugzeitmessungen bestimmen. Um die Relativenergie auf 20 keV genau auflösen zu können, muss die Flugzeitmessung eine Auflösung von $\sigma_t <$ 150 ps haben. Um dies zu erreichen müssen die Photodetektoren genau kalibriert und synchronisiert werden. Dieses Verfahren wurden in R3BRoot implementiert und ermöglicht in wenigen Schritten eine vollständige Kalibrierung von NeuLAND. Die Qualität der Kalibrierung wird anhand einer kleinen Analyse von experimentellen Daten veranschaulicht. Unterstützt durch das BMBF (05P15RDFN1)

HK 27.52 Di 16:45 F Foyer

Track-based Misalignment Corrections for the CBM Silicon Tracking Detector — •Susovan Das for the CBM-Collaboration — Physikalisches Institut, Eberhard karls Universität Tübingen

The Silicon Tracking System (STS) is the central tracking detector of the CBM experiment. It consists of 8 layers of altogether ∼900 double-sided silicon strip sensors. The sensors have a strip pitch of 58μm yielding an intrinsic resolution of ∼20μm. On the other hand, we expect a mechanical precision of the STS assembly not better than ∼100μm. Therefore, the intrinsic resolution has to be recovered by software based alignment methods. The software correction is based on the MILLEPEDE package.

In this contribution we present different misalignment scenarios which reflect the hierarchy of the mechanical assembly of the STS, i.e., stations, units, ladders, sensors. We evaluate the effect of the misalignment of the various components onto the tracking efficiency and momentum resolution of the detector by simulations using UrQMD events.

In a further step we explore how well, and within which limits, the track-based MILLEPEDE algorithms are able to recover the ideal resolution of an undistorted detector.

• This work was supported by grant **BMBF-05P16VTFC1**

HK 27.53 Di 16:45 F Foyer

A high density readout system for TREX at MINIBALL — •Christian Berner, Christoph Berger, Shawn Bishop, Michael Böhmer, Roman Gernhäuser, Stefanie Hellgartner, Ralf Lang, Lukas Werner, and Sonja Winkler — Technische Universität München, Physik-Department

TREX is a versatile silicon detector for measuring transfer and Coulex reactions with heavy, neutron-rich beams at CERN/ISOLDE. It is an array of position-sensitive ΔE-E-detector telescopes in a compact setup, covering 66% of the full solid angle. Currently the resolution of reconstructed energies and the efficiency of the setup is limited by the angular resolution, the trigger threshold, and the electronics noise. An upgrade of the silicon sensors using highly segmented $d = 100\mu$m thick DSSDs with 100μm pitch with a high density readout system using an ASIC-based solution with calorimetric performance is discussed. The SKIROC2-ASIC offers - despite of its low ENC, the possibility to have an analogue, as well as a fully digitized readout. Its large dynamic range and the ability to power-pulse the different ASIC-stages only during the beam pulses are perfect features for TREX at ISOLDE. System control, trigger and readout of the new detector array will be implemented on a FEBEX-based data-platform, also used for the surrounding Germanium-array MINIBALL. We will present the detection concept, first prototype test and the performance estimations from Geant4 simulations. This work is supported by BMBF (05P15WOCIA).

HK 27.54 Di 16:45 F Foyer

Construction of a neutron source for silicon detector irradiation — •Eduard Friske — Uni Tübingen, Tübingen, Germany

The silicon strip sensors of the Silicon Tracking System used for the CBM experiment at FAIR are subject to high doses of ionizing and non-ionizing radiation. Simulations predict the total non-ionizing dose to reach $\approx 10^{14}$ n_{eq}/cm^2.

To verify the predicted changes in detector performance due to radiation damage, a tunable neutron source has been constructed. It uses the deuteron beam of a Van-de-Graaf accelerator to produce neutrons using D-D fusion. The gas cell containing the deuterium gas is cooled to cryogenic temperatures with liquid nitrogen to maximize gas density and increase the neutron output while retaining a compact source design.

The goal of the setup is to reach the simulated dose within several

weeks. This long irradiation time allows to monitor the degradation and change in electrical properties of the irradiated sensor under realistic conditions. Live monitoring of the sensor is achieved by a collimated beta source creating hits which are read out by a commercial readout system.

HK 27.55 Di 16:45 F Foyer

Quality assurance measurements for the PANDA Barrel DIRC quartz radiators — •Marvin Krebs[1,2], Klaus Peters[1,2], Georg Schepers[1], Carsten Schwartz[1], and Jochen Schwiening[1] — [1]GSI Helmholtzzentrum fuer Schwerionenforschung GmbH — [2]Goethe-University Frankfurt

The PANDA experiment at the Facility for Antiproton and Ion Research in Europe (FAIR) at GSI, Darmstadt, will study fundamental questions of hadron physics and QCD. A fast focusing DIRC (Detection of Internally Reflected Cherenkov light) counter will provide hadronic particle identification (PID) in the barrel region of the PANDA detector. To meet the PID requirements, the Barrel DIRC has to provide precise measurements of the Cherenkov angle, which is conserved for Cherenkov photons propagating through the radiator by total internal reflection. The radiators, rectangular quartz bars, have to fulfill strict optical and mechanical requirements. This includes the squareness and parallelism of the sides of the bars, sharp corners, and a very smooth surface polish, ensuring that the Cherenkov photons reach the optical sensors without angular distortions. Two possible radiator shapes are being considered for the final detector design: either a conservative design with narrow bars or a cost-saving option using a wide plate An optical setup, consisting of a computer-controlled positioning and multi-wavelength laser system, is used to evaluate the radiators to obtain critical values like transmittance and reflectivity. The Setup, measuring procedure and results from radiator bar- and plate measurements will be presented on this poster. Work supported by HGS-HIRe.

HK 27.56 Di 16:45 F Foyer

Radiation Hardness of pcCVD Detectors and precise IC Calibration — •Steffen Schlemme[1,2], Mladen Kis[1], Chiara Nociforo[1], Fabio Schirru[1], Joachim Enders[2], P. Figuera[3], J. Frühauf[1], A. Kratz[1], N. Kurz[1], S. Löchner[1], A. Musumarra[3,4], S. Salamone[3], B. Szczepanczyk[1], M. Träger[1], and R. Visinka[1] — [1]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — [2]TU Darmstadt, Darmstadt, Germany — [3]LNS-INFN Catania, Italy — [4]University of Catania, Italy

A new in-flight separator Super-FRS is under construction at FAIR/Darmstadt. Ion rates up to 3×10^{11} ^{238}U/spill demand an adaptation of detectors to a high radiation environment. A test experiment to investigate the radiation hardness of polycrystalline diamond detectors(pcCVD) was performed at the LNS-INFN in Catania using a ^{12}C beam at 62MeV/u and intensities of up to 1.5pnA. The setup consisted of pcCVD strip detectors to measure the beam profile, a single crystal diamond detector to calibrate the IC working in current mode as a beam intensity monitor and a pcCVD sample to be irradiated. The IC used was designed for FAIR and showed a stable counting rate allowing us to calibrate and perform beam intensity measurements with it. The results showed no decrease of the signal quality before and after the irradiation of 3.5MGy. A second experiment at GSI aimed at a very precise calibration of this IC using a plastic scintillator as reference, achieving a relative precision below 1%.
Gefördert durch HGS-HIRe, den GSI-TU Darmstadt-Kooperationsvertrag und das BMBF (05P15RDFN1).

HK 27.57 Di 16:45 F Foyer

Status of the scatterer component of a Compton camera for ion beam range verification in proton therapy — •S. Liprandi[1], S. Aldawood[1,2], V. Beck[1], M. Mayerhofer[1,3], T. Binder[1], I. V.-Lozano[1], J. Bortfeldt[1], L. Maier[4], R. Lutter[1], R. Gernhäuser[4], G. Pausch[5], W. Enghardt[5,6], F. Fiedler[6], G. Dedes[1], K. Parodi[1], and P. G. Thirolf[1] — [1]LMU München, Germany — [2]King Saud Univ., Riyadh, Saudi Arabia — [3]Univ. Hamburg, Germany — [4]TU München, Germany — [5]OncoRay and TU Dresden, Germany — [6]Helmholtz-Zentrum Dresden-Rossendorf, Germany

At LMU we are developing a Compton camera, designed to detect prompt γ-rays induced by nuclear reactions, during the irradiation of tissue in particle therapy. Our prototype consists of a stack of double-sided silicon strip detectors acting as scatterers and an absorber formed by a $LaBr_3$(Ce) scintillator. Both detectors have been characterized off- and online at different accelerator facilities, showing good agreement with MC simulations. Here, the present readout for the DSSSDs (based on the GASSIPLEX ASIC chip) revealed several limitations that urge for an improved upgrade. This poster will focus on the status of the scatterer component and its readout: a characterization of the detectors and specifications for their readout will be shown. Different readout options will be presented, together with first tests performed using a system based on the AGET ASIC chip.

This work was supported by the DFG Cluster of Excellence Munich Centre for Advanced Photonics (MAP) and KSU, Riyadh, Saudi Arabia.

HK 27.58 Di 16:45 F Foyer

Untersuchung systematischer Effekte für das P2-Experiment — •Sebastian Baunack[1], Niklaus Berger[1], Kurt Aulenbacher[1,2], Jürgen Diefenbach[1], Kathrin Gerz[1], Ruth Herbertz[1], Frank Maas[1,2], Matthias Molitor[1], David Rodriguez Pineiro[1,2], Iurii Sorokin[1], Hubert Spiesberger[1,3], Alexey Tyukin[1], Valerie Tyukin[1] und Marco Zimmermann[1] — [1]PRISMA Cluster of Excellence und Institut für Kernphysik, Johannes Gutenberg-Universität Mainz — [2]Helmholtz-Institut Mainz — [3]PRISMA Cluster of Excellence und Institut für Physik, Johannes Gutenberg-Universität Mainz

Die P2-Kollaboration bereitet derzeit eine Messung des schwachen Mischungswinkels $\sin^2\theta_w$ mittels elastischer Elektron-Proton-Streuung vor. Die angestrebte relative Genauigkeit beträgt 0.15% und ist damit vergleichbar mit den derzeit genauesten Messungen am Z-Pol. Das Experiment soll am neu zu errichtenden Elektronenbeschleuniger MESA in Mainz durchgeführt werden.

Die erreichbare Präzision hängt sowohl von der zu erreichenden statistischen Unsicherheit in der Messung der paritätsverletzenden Asymmetrie also auch von zahlreichen systematischen Effekten ab, z.B. den helizitätskorrelierten Differenzen in den Parametern Lage, Intensität und Energie des Elektronenstrahls. Eine Untersuchung dieser Effekte wird vorgestellt.

HK 27.59 Di 16:45 F Foyer

P2 - A fused silica Cherenkov detector for the high precision determination of the weak mixing angle — •Kathrin Schier[1], Dominik Becker[1], Sebastian Baunack[1], Michael Gericke[2], and Frank Maas[1] for the P2-Collaboration — [1]Institut für Kernphysik Mainz — [2]University of Manitoba

The weak mixing angle is a central parameter of the standard model and its high precision determination is tantamount to probing for new physics effects.

The P2 experiment at the MESA accelerator in Mainz will perform such a measurement of the weak mixing angle via parity violating electron-proton scattering. We aim to determine sin 2 (Θ W) to a relative precision of 0.13%. Since the weak charge of the proton is small compared to its electric charge, the measurable asymmetry is only 33ppb, requiring a challenging measurement to a precision of only 0.44ppb. In order to achieve this precision we need to collect very high statistics and carefully minimize interfering effects like apparatus induced false asymmetries.

We present the status of the development of an integrating fused-silica Cherenkov detector, which is suitable for a high precision and high intensity experiment like P2. The contribution will focus on the investigation of the detector*s response to incoming signal and background particles determined by both MC simulations and by measurements at the MAMI facility in Mainz.

HK 27.60 Di 16:45 F Foyer

Feature extraction and calibration concepts for a prototype of the PANDA barrel EMC — •Stefan Diehl, Kai-Thomas Brinkmann, Rainer Novotny, Christoph Rosenbaum, and Hans-Georg Zaunick for the PANDA-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen

The electromagnetic calorimeter (EMC) of the PANDA detector at the future FAIR facility will consist of more than 15,000 lead tungstate (PWO) crystals which are operated at -25 °C to increase the light yield of PWO. It will be one of the central components of PANDA to achieve the physics goals in studying the interaction of cooled antiprotons with a fixed target. The focus of the contribution will be on the barrel part of the target EMC. The signals from the APD read out of the crystals, which are shaped and amplified by a customized ASIC, will be digitized by a sampling ADC. Based on the response of a close-to-final prototype to photons in the energy range between 50 MeV and 800 MeV, different feature extraction and calibration concepts will be compared. It has been shown, that a feature extraction via a fit of the

signal shape provides a significant improvement of the energy resolution in the energy range below 100 MeV, compared to a simple peak sensing feature extraction. In addition it has been shown that a calibration based on the energy deposition of cosmic muons, in comparison to detailed GEANT4 simulations, taking all light collection effects into account, can be an excellent first step for a calibration of the calorimeter. *The Project is supported by BMBF, GSI and HIC for FAIR. S. D. is supported by JLU Gießen through a JUST'us scholarship grant.

HK 27.61 Di 16:45 F Foyer

Construction and Assembly of the first Barrel Slice for the Electromagnetic Calorimeter of the PANDA experiment — •Markus Moritz[1], Hans-Georg Zaunick[1], Valera Dormenev[1], Andrey Ryazantsev[2], Thomas Wasem[1], Benjamin Wohlfart[1], Christopher Hahn[1], René Schubert[1], Stefan Diehl[1], and Kai-Thomas Brinkmann[1] for the PANDA-Collaboration — [1]II. Physikalisches Institut, Justus-Liebig-Universität Gießen — [2]IHEP Protvino, Russia

The first major assembly stage of the barrel part of the electromagnetic calorimeter of the PANDA experiment at the future FAIR facility by assembling one single barrel slice segment will be presented. The calorimeter is composed of two endcaps and a barrel covering the major part of the solid angle consisting of more than 11.300 tapered PbWO4 crystals. Each scintillator module is readout via two large area avalanche photo diodes connected to custom made ASIC-preamplifier. The construction of the first segment comprises a full length slice beam holding in total 18 module blocks. Each block consists of a matrix of 4x10 crystals. The assembly procedure of single detector modules, module blocks and the overall slice segment, respectively will be discussed. Test results of single components and fully assembled detector modules will be discussed and compared with earlier prototype in-beam and lab tests. Supported by BMBF, GSI and HIC for FAIR.

HK 27.62 Di 16:45 F Foyer

Development and Detector Characterization of COBRA GEMs — •Thomas Klemenz — TU München, Physik Department E62, Excellence Cluster 'Universe', Garching

The requirements of the next generation experiments in particle physics are the driving factors for the development of new technologies. Detectors have to handle harsh radiation in high luminosity environments providing stability at high read out rate. In Time Projection Chamber (TPC) detectors, in addition, a low ion back flow (IBF) is needed not to introduce distortion of the drift field. Multi Wire Proportional Chambers (MWPCs), commonly used as read out for the TPC, provide IBF suppression by introducing a gating grid. Because of its limited read out rate, however, the MWPC is now being gradually replaced. Instead, Gas Electron Multiplier (GEM) foils are being used since they provide continuous operation due to the intrinsic IBF suppression. A new type of GEM, the COBRA GEM, was proposed, which may provide a further reduction of the IBF. By implementing ring-like electrodes around the GEM holes, yet another degree of freedom for controlling the IBF is provided.

We report on the effective gain and IBF suppression measurements with a single thick COBRA GEM as a function of various HV settings.

This research was supported by the DFG cluster of excellence 'Origin and Structure of the Universe'.

HK 27.63 Di 16:45 F Foyer

Charge transfer properties of Gas Electron Multipliers — •Jonathan Ottnad, Markus Ball, Viktor Ratza, and Bernhard Ketzer — Helmholtz-Institut für Strahlen und Kernphysik, Bonn, DE

Gas Electron Multipliers (GEM) are state-of-the-art technology to achieve charge multiplication in gaseous detectors. While GEMs proved their reliable operation and excellent behaviour in terms of energy and spatial resolution and high rate capability in experiments like COMPASS, LHCb and others, the characteristics of the charge transfer and multiplication processes have not yet been studied in full detail.

The optimization of a GEM-based readout requires the study of several parameters. The GEM geometry as well as the electric field configuration influence the transfer of the charges. The poster shows the results of a set of systematic measurements for the electron charge transfer. The measurements are compared to the data of a microscopic simulation. Furthermore the agreement with the calculation of a charge density model is presented.

Supported by SFB/TR 16.

HK 27.64 Di 16:45 F Foyer

Folienbasierte Auslesestrukturen für GEM-Detektoren am MAGIX-Experiment bei MESA — •Yasemin Schelhaas für die MAGIX-Kollaboration — Institut für Kernphysik der Universität Mainz

Das MAGIX-Experiment ist Teil des neuen Beschleunigerkomplexes MESA am Institut für Kernphysik in Mainz, der in den kommenden Jahren in Betrieb genommen werden soll. Im energierückgewinnenden Modus, der einen hohen Strahlstrom von bis zu 1 mA ermöglicht, wird das MAGIX-Experiment installiert. Hier können Präzisionsmessungen im Niederenergiebereich mit hoher Statistik durchgeführt werden. Dazu zählt die Suche nach dunklen Photonen, die Bestimmung des magnetischen Protonenradius oder auch die Bestimmung des astrophysikalischen S-Faktors.

Diese Posterpräsentation befasst sich insbesondere mit der Auslesestruktur der ortsauflösenden GEM-Detektoren in der Fokalebene der geplanten Magnetspektrometer. Diese Detektoren sollen eine finale Größe von $1,20\,\mathrm{m} \times 0,30\,\mathrm{m}$ haben. Da die Energien von MAGIX im Bereich von 5 MeV bis 105 MeV liegen, müssen die Detektoren eine sehr geringe Strahlungslänge aufweisen. Im Rahmen einer Masterarbeit werden verschiedene folienbasierte Layouts der Auslesestrukturen bezüglich ihrer Vor- und Nachteile diskutiert. Im Detail wird eine kombinierte Auslesestruktur aus Streifen und verbundenen Pads (Strads) beschrieben.

HK 27.65 Di 16:45 F Foyer

Measurements with CBM-TRD Prototypes at the CERN SPS in 2015 — •Patrick Schneider and Dennis Spicker for the CBM-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt am Main

CBM as the heavy-ion experiment at FAIR is designed to investigate the properties of strongly interacting matter at highest net-baryon densities. The main purpose of the Transition Radiation Detector (TRD) will be to discriminate electrons and pions over a large region of particle momenta.

We present two analyses of data acquired in a test-setup with two TRD prototypes in a Pb beam at the SPS at CERN in November and December 2015. These prototypes already have the full size (59x59 cm^2) of the final TRD chambers and used SPADIC v1.0 read out electronics.

The first part investigates the capability of the TRD to operate at high hit-rates by analyzing the current measurements at the anode wires, while the second part displays the spatial resolution of the protoypes by analysing time-correlated events measured in the two chambers.

Generally, a good performance of the TRD in the high-rate environment is observed.

Supported by the German BMBF-grant 05P15RFFC1

HK 27.66 Di 16:45 F Foyer

Study of the spatial resolution of a monolithic $LaBr_3$:Ce scintillator — •Michael Mayerhofer[1,2], S. Aldawood[1,3], T. Binder[1], G. Dedes[1], R. Gernhäuser[5], S. Liprandi[1], R. Lutter[1], L. Maier[5], A. Miani[1,4], K. Parodi[1], D.R. Schaart[6], I. Valencia Lozano[1], and P.G. Thirolf[1] — [1]LMU München, Germany — [2]Univ. Hamburg, Germany — [3]King Saud Univ., Riyadh, Saudi Arabia — [4]Univ. degli Studi di Milano, Italy — [5]TU München, Germany — [6]TU Delft, Netherlands

We develop a Compton camera for ion-beam range verification during hadron therapy by detecting prompt γ rays from nuclear reactions between the beam and organic tissue. The camera consists of a scatterer (6 layers of double-sided Si-strip detectors) and a $LaBr_3$(Ce) scintillator as absorber, read out by a multianode photomultiplier. Key ingredient of the γ-source reconstruction is the determination of the γ-ray interaction position in the scintillator. This contribution will focus on the "k-Nearest Neighbor" (k-NN) and the "Categorical Average Pattern" (CAP) algorithm [1]. Both require a large reference library of 2D light amplitude distributions, derived by scanning the scintillator front surface with tightly collimated ^{60}Co and ^{137}Cs sources and a fine step size (0.5 mm). The determination of the spatial resolution as a function of the photon energy, the PMT granularity and the systematic performance of the two algorithms will be present.

This work was supported by the DFG Cluster of Excellence Munich Centre for Advanced Photonics (MPA).

[1]van Dam et al., IEEE TNS 58 (2011).

HK 27.67 Di 16:45 F Foyer

Evaluation of a scintillator readout system based on a Silicon Photomultiplier (SiPM) Array and an ASIC-based readout system for a Compton camera — •Tim Binder[1,2], S. Aldawood[1,4], G. Dedes[1], T. Ganka[2], R. Gernhäuser[5], S. Liprandi[1], R. Lutter[1], L. Maier[5], M. Mayerhofer[1,3], A. Miani[1,6], K. Parodi[1], F. Schneider[2], and P.G Thirolf[1] — [1]LMU München, Germany — [2]Ketek GmbH, Munich, Germany — [3]Univ. Hamburg, Germany — [4]King Saud Univ., Riyadh, Saudi Arabia — [5]TU München, Germany — [6]Univ. degli Studi di Milano, Italy

The LMU Compton camera prototype consists of a scatterer (6 layers of double-sided Si-strip detectors) and an absorber ($LaBr_3$) with a photomultiplier tube (PMT) and NIM/VME based readout. In order to optimize the system for different applications, a set of alternative components was evaluated. Firstly, a $CeBr_3$ crystal, providing an increased S/N ratio, due to the absence of internal radioactivity compared to $LaBr_3$, is read out with the present electronics and the spatial resolution is determined. Secondly, a SiPM array and an ASIC-based readout system, allowing the Compton camera to be used in multimodal imaging devices (e.g. combined with MRI), is evaluated. Therefore results of nonuniformity and temperature dependence measurements of the single component's channels, as well as for the combined system are presented. Finally, energy spectra are reconstructed and the energy resolution is compared to results from a standard readout system.

This work was supported by the DFG Cluster of Excellence Munich Centre for Advanced Photonics (MAP) and KETEK GmbH.

HK 27.68 Di 16:45 F Foyer

Study of the spatial resolution of a monolithic $LaBr_3$:Ce scintillator — •Michael Mayerhofer[1,2], S. Aldawood[1,3], T. Binder[1], G. Dedes[1], R. Gernhäuser[5], S. Liprandi[1], R. Lutter[1], L. Maier[5], A. Miani[1,4], K. Parodi[1], D.R. Schaart[6], I. Valencia Lozano[1], and P.G. Thirolf[1] — [1]LMU München, Germany — [2]Univ. Hamburg, Germany — [3]King Saud Univ., Riyadh, Saudi Arabia — [4]Univ. degli Studi di Milano, Italy — [5]TU München, Germany — [6]TU Delft, Netherlands

We develop a Compton camera for ion-beam range verification during hadron therapy by detecting prompt γ rays from nuclear reactions between the beam and organic tissue. The camera consists of a scatterer (6 layers of double-sided Si-strip detectors) and a $LaBr_3$(Ce) scintillator as absorber, read out by a multianode photomultiplier. Key ingredient of the γ-source reconstruction is the determination of the γ-ray interaction position in the scintillator. This contribution will focus on the "k-Nearest Neighbor" (k-NN) and the "Categorical Average Pattern" (CAP) algorithm [1]. Both require a large reference library of 2D light amplitude distributions, derived by scanning the scintillator front surface with tightly collimated ^{60}Co and ^{137}Cs sources and a fine step size (0.5 mm). The determination of the spatial resolution as a function of the photon energy, the PMT granularity and the systematic performance of the two algorithms will be present.

This work was supported by the DFG Cluster of Excellence Munich Centre for Advanced Photonics (MPA).

[1]van Dam et al., IEEE TNS 58 (2011).

HK 27.69 Di 16:45 F Foyer

Energy resolution measurements with the CBM-TRD using a ^{55}Fe-Source — •Marcel Raabe for the CBM-Collaboration — Institut für Kernphysik Goethe Universität Frankfurt

The goal of the Compressed Baryonic Matter (CBM) experiment at FAIR is to measure the QCD phase diagram at high net-baryon densities. The Transition Radiation Detector (TRD) of CBM is designed for electron pion discrimination over a large region of particle momenta. It consists of radiators and multi wire proportional chambers filled with a gas mixture of 85% Argon and 15% CO_2. A full-size (59 x 59 cm^2) prototype has been build at the Institut für Kernphysik in Frankfurt (IKF) and is equipped with a plane of anode wires with alternating high voltages. The produced charge is measured with a pad plane on the backside.

We present energy resolution measurements with the current IKF TRD design using a Fe55-Source. The results obtained from the pad plane readout with the SPADIC v1.0 electronics will be compared with measurements using the anode wires for readout.

Supported by the German BMBF-grant 05P15RFFC1

HK 27.70 Di 16:45 F Foyer

Testing prototype Micron X5 silicon-strip detectors for the R^{3}B setup — •Sonja Storck[1], Ina Syndikus[1,2], Dominic Rossi[1,2], Thomas Aumann[1,2], and Stefanos Paschalis[1,2,3] for the R3B-Collaboration — [1]TU Darmstadt, Germany — [2]GSI, Darmstadt, Germany — [3]University of York, United Kingdom

With the R^{3}B (Reactions with Relativistic Radioactive Beams) setup at GSI in Darmstadt, it is possible to perform kinematically complete measurements with relativistic radioactive beams. In order to identify the incoming and outgoing particles, various detector systems are necessary. Among other systems, silicon-strip detectors are used with which the positions and the energy loss of particles before and after the target are measured.

Two new prototypes of double-sided silicon-strip detectors, Micron X5, were tested in-beam during a beam time at GSI in 2016. The detectors have 32 strips on each side which are arranged perpendicularly to each other to give an x and y position in the same detector. The strips have a resistive surface and are read out either along or across each strip. The detectors were tested regarding the energy and position resolution in addition to their efficiency.

This work is supported in part by BMBF contract 05P15RDFN1 and GSI-TU Darmstadt cooperation agreement.

HK 27.71 Di 16:45 F Foyer

Investigation of CO_2-based Cooling for the CBM Silicon Tracking System — •Kshitij Agarwal for the CBM-Collaboration — Physikalisches Institut der Universität Tübingen

As the core detector of the CBM experiment, the Silicon Tracking System (STS) located in the dipole magnet provides track reconstruction & momentum determination of charged particles from beam-target interactions. Due to the expected irradiation damage, the sensors will dissipate some power and have to be kept at or below -5°C by complete removal of the heat dissipated by the front-end electronics (FEE) boards (∼40kW). The heat must be removed to avoid thermal runaway and reverse annealing of the irradiated silicon sensors. So the STS will be operated in a thermal insulation box and will use bi-phase CO_2 cooling system for the FEE.

Thermal conductivity measurements between different thermal interfaces will be shown by using higher thermal conductivity interface materials to replace all the space that otherwise would be occupied by air. Water will be used as the coolant for measurements, which will then be verified by using bi-phase CO_2. This effort is towards building a cooling demonstrator for two STS half-stations to show that the CBM-STS cooling concept is viable. Thermal interface results, both experimental and simulation, followed by the initial construction R&D of thermal insulation box and their respective future plans will be presented.

This work is supported by GSI/FAIR.

HK 27.72 Di 16:45 F Foyer

The primary target for the hypernuclear experiment at $\bar{\text{P}}$ANDA — Sebastian Bleser[1], Michael Bölting[1], Felice Iazzi[2], Josef Pochodzalla[1,3], Alicia Sanchez Lorente[1], •Falk Schupp[1], Marcell Steinen[1], and Christian Tiefenthaler[1] — [1]Helmholtz-Inst. Mainz — [2]Politec. and INFN, Torino — [3]Inst. für Kernphysik, JGU Mainz

A key aspect of the $\bar{\text{P}}$ANDA experiment at the future FAIR facility is the production and spectroscopy of $\Lambda\Lambda$ hypernuclei. The double hypernuclei are produced in a two-stage target system consisting of a primary in-beam filament to produce low momentum Ξ^- hyperons which are stopped and converted into two Λ hyperons in a secondary external target.

A system of piezo motors will be used to steer the primary target in two dimensions. This allows to achieve a constant luminosity by adjusting the position and provides the replacement of eventually broken target wires.

The poster shows the first prototype mounted with vacuum-capable motors. The optical wire-based sensor in development for position control is presented. Motion and position control is managed using the EPICS framework.

HK 27.73 Di 16:45 F Foyer

Thickness monitoring at the Cluster-Jet Target for $\bar{\text{P}}$ANDA — •Ann-Katrin Hergemöller, Daniel Bonaventura, Silke Grieser, Benjamin Hetz, Matthias Seifert, and Alfons Khoukaz — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

The first internal target which will be operated at the $\bar{\text{P}}$ANDA experiment at FAIR is a cluster-jet target. Within this target the cluster

beam itself is formed by the expansion of pre-cooled gases within a Laval nozzle. To prepare the cluster beam two orifices are used, the skimmer and the collimator. For $\bar{\text{P}}$ANDA a target thickness of more than 10^{15} $\frac{\text{atoms}}{\text{cm}^2}$ in a distance of 2.1 m behind the nozzle is required to achieve the designated luminosity. With the target prototype, operating successfully for years at the University of Münster, it is routinely possible to provide thicknesses of more than 2×10^{15} $\frac{\text{atoms}}{\text{cm}^2}$ in the required distance. Based on the experimental results of the cluster target prototype the final cluster-jet target source was designed and set into operation in Münster as well. To monitor the cluster beam and to determine the thickness two different monitor systems are included in the setup. In this presentation an overview of the target design, the monitor systems and their performance will be presented and discussed. Supported by BMBF, HGS HIRe and GSI F+E.

HK 27.74 Di 16:45 F Foyer

Test of a PCIe based readout option for PANDA — •Simon Reiter[1], Heiko Engel[2], Sören Lange[1], and Wolfgang Kühn[1] — [1]Justus-Liebig-Universität Giessen, Germany — [2]Goethe-Universtität Frankfurt, Germany

The future PANDA detector will achieve an event rate at about 20 MHz resulting in a high data load of up to 200 GB/s. The data acquisition system will be based on a triggerless readout concept with intelligent sampling ADCs, leading to the requirement of large data bandwidth. The data reduction will be guaranteed on the first level by an array of FPGAs running a full online reconstruction followed by a CPU/GPU cluster on the second level. This is foreseen to achieve a reduction factor of more than 1000.

The C-RORC (Common Readout Receiver Card), originally developed for ALICE (A. Borga et al., JINST 10 (2015) 02, C02022), is an expansion card which can establish the connection between the first and the second level.

A test system with 12 links (SFP, 1 Gbps) sending in parallel was tested, writing the data to memory with a PCIe 2.0 interface (8 lanes). A bandwidth of 1149.6 MB/s was reached in a long-term test of 48 hours without errors. Detailed test results will be presented.

*This work is supported by BMBF(05P15R6FPA).

HK 27.75 Di 16:45 F Foyer

The ARAGORN Front-End - FPGA Based Time-to-Digital Converter with Superior Optical Readout Capabilities — •Maximilian Büchele, Horst Fischer, Florian Herrmann, and Carl Schaffer — Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, 79104 Freiburg, Germany

The ARAGORN front-end offers high-performance readout capabilities for state-of-the-art high-energy physics experiments. The design constraints aim to develop a cost-effective, fully configurable Time-to-Digital Converter (TDC) platform with considerable channel density at smallest form factor possible, allowing for precise time-of-flight or drift-time measurements. The front-end module employs 4+1 Xilinx Artix-7 FPGAs, four of which implement the TDC feature processing a total of 384 channels with an average time resolution of 165 ps. The acquired data is passed on to the fifth on-board FPGA acting as data hub and generic master for auxiliary board components. The board has been designed to set up a multi-tiered optical readout network. Therefore, a SFP transceiver socket for data output and a CXP compliant receptacle reside on the ARAGORN front-end to optionally enable fiber-optic communication with up to seven boards through a star topology. The hot-pluggable CXP module connects to the satellite boards through an optical breakout cable. This novel approach permits to read out in total eight boards yielding 3072 input channels via a single optical fiber at a bandwidth of 6.6 Gb/s. This work is supported by BMBF.

HK 27.76 Di 16:45 F Foyer

Research and Development for the PANDA Backward End-Cap of the Electromagnetic Calorimeter — Heybat Ahmadi[1,2], Samer Ahmed[1,2], Alexander Aycock[1,2], Luigi Capozza[1], Alaa Dbeyssi[1], Bertold Fröhlich[1,2], Phillip Grasemann[1,2], Sebastian Haasler[1,2], David Izard[1], Dmitry Khaneft[1,2], Jörg Köhler[1,2], Frank Maas[1,2,3], Maria Carmen Mora Espí[1], Oliver Noll[1,2], •David Rodríguez Piñeiro[1], Javier Jorge Rico[1], Sahra Wolff[1,2], Manuel Zambrana[1,2], and Iris Zimmermann[1,2] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

The PANDA experiment will be one of the key projects of the new accelerator facility FAIR in Darmstadt. With its mature detector system it will be able to observe a variety of physical channels. Thus it will make a huge contribution to the understanding of the strong interaction. The electromagnetic process group (EMP) in Mainz is developing the backward end-cap (BWEC) of the electromagnetic calorimeter. For its construction various tests regarding mechanics have been carried out and are foreseen within the R&D framework. A full prototype of the moving supporting system was built and tested, comprising insertion rails and a movable trolley base. The rails were divided in two sections (fixed and removable in PANDA). A big change in the crystal support is being implemented as well and will be validated with a test setup, using FR4 as supporting material. In addition thermal studies using our current proto16 will be carried out.

HK 27.77 Di 16:45 F Foyer

Forward Detector for physics at FAIR with HADES — •Rafal Lalik for the HADES-Collaboration — Technische Universität München, Excellence Cluster Universe

The Forward Detector is an upcoming upgrade of the HADES spectrometer meant to enhance its geometrical acceptance for experiments with higher energies as planned at the upcoming FAIR facility. It contains three new detector systems: straws tubes for tracking particles, a RPC and a Forward Wall for measuring the time of flight. The Forward Detector will allow HADES to extend the angular acceptance of the spectrometer into very forward direction, from 0° to 7° in the polar angle. It will play a leading role in the identification of decays of highly anisotropic resonances, providing signal statistics higher by factor of a few in respect to the original HADES geometry. Together with future Electromagnetic Calorimeter, it will open possibility to measure for the first time hyperons radiative decays branching ratios, specifically $\Lambda(1405) \to \Lambda\gamma$ and $\Lambda(1405) \to \Sigma^0\gamma$, which are unknown. The Branching ratios according Kaxiras et al (PRD32), will allow to determine the internal structure of $\Lambda(1405)$ resonance, which is heavily discussed either as a two pole KN-$\Sigma\pi$ resonance or penta-quark. With the increased acceptance HADES will be able to measure the production of Ξ in proton-proton reactions. These measurements are a crucial reference to understand the production of Ξ in heavier system at HADES, which showed enhancement of this baryon in sub-threshold range, an effect which is not explainable by any of the existing transport models.

* This work is supported by BMBF 05P15WOFCA.

HK 27.78 Di 16:45 F Foyer

Feature extraction of the electromagnetic calorimeter preamplifier (APFEL ASIC) for the $\bar{\text{P}}$ANDA experiment at FAIR — S. Ahmed[1,2], A. Aycock[1,2], L. Capozza[1], A. Dbeyssi[1], B. Fröhlich[1,2], P. Grasemann[1,2], S. Haasler[1,2], D. Izard Hernandez[1], D. Khaneft[1,2], J. Köhler[1,2], F. Maas[1,2,3], M. C. Mora Espí[1], O. Noll[1,2], D. Rodríguez Piñeíro[1], J. Jorge Rico[1], •S. Wolff[1,2], M. Zambrana[1,2], and I. Zimmermann[1,2] — [1]HIM, Mainz — [2]KPH, Mainz — [3]PRISMA, Mainz

The $\bar{\text{P}}$ANDA experiment at the upcoming FAIR accelerator facility will study antiproton annihilation reactions at antiproton beam momenta from 1.5 GeV/c up to 15 GeV/c. With its modular multi purpose detector system it will be able to observe a variety of physical channels. The electromagnetic process group (EMP) in Mainz is developing the Backward-End-Cap (BWEC) of the electromagnetic calorimeter. A prototype calorimeter, PROTO16, has been developed to improve different components of the BWEC. PROTO16 employs a very realistic setup as in the BWEC such as cooling, insulation and signal processing. In addition, PROTO16 is equipped with a proper slow control, which is capable of controlling and reading out all relevant components of the detector. During three different test beamtimes at the MAMI (Mainzer Mikrotron), the prototype properties have been intensely studied and improved. An energy resolution of 2,5% at 1GeV and a lowest single threshold of 3MeV has been achieved. Our poster explains the main features of the $\bar{\text{P}}$ANDA -calorimeter and provides information about the latest analysis results for the PROTO16 test with electron beam.

HK 27.79 Di 16:45 F Foyer

Development of a beam profile monitor using thin scintillator stripes with SiPM readout — •Gerrit Keller, Josef Pochodzalla, Patrick Achenbach, Philipp Herrmann, Pascal Klag, and Maik Biroth — Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz

MAMI is a microtron accelerator at the Institute for Nuclear Physics at the University of Mainz. It provides electron beams with submillimetre diameter. For precision measurements it is important to have well

defined beam parameters. We have developed a beam profile monitor using thin plastic scintillator. The setup consists of stacked scintillator stripes readout by Silicon Photomultipliers (SiPM). The single stripes consist of 6 mm wide and 150 μm thick BC400 plastic scintillator by Saint-Gobain. Each is read out by two SiPMs using coincidence technique to supress dark noise. Used SiPMs are 6 mm × 6 mm by SensL. We'll report on tests using radioactive sources and general detector performance.

HK 27.80 Di 16:45 F Foyer

Simulations and experiments for the next-generation cryogenic stopping cell of the Super-FRS — •Ivan Miskun for the FRS Ion Catcher-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Gießen, Gießen, Germany

A design of a new-generation cryogenic stopping cell (CSC) for the Low-Energy Branch of the Super-FRS at FAIR has been recently developed. It is based on the experience obtained with the CSC prototype, which was successfully commissioned over a series of beamtimes at the FRS Ion Catcher at GSI.

The new system will have improved performance parameters due to the implementation of novel concepts in its design. The extraction direction will be changed from inline to perpendicular to the axis of the incident beam, hence decreasing the path of ions inside the CSC. In combination with high electrical fields applied, this will shorten the extraction times by a factor of 5 ($\sim$ 5 ms in comparison with $\sim$ 25 ms for CSC prototype) and also improve the rate capabilities of the system by three orders of magnitude. The inner chamber will be divided in two parts: high-density stopping region ($\sim$ 30 mg/cm^2 of He) and low-density extraction region. Simulation investigations of ion transport in the system have been performed and an experimental confirmation of some of the novel concepts for the future system has been made.

HK 27.81 Di 16:45 F Foyer

An electroluminescence tracking TPC for high rates — •Markus Ball, Bernhard Ketzer, and Konstantin Muenning — Helmholtz Institut für Strahlen und Kerphysik, Universität Bonn

We will discuss a novel method to amplify primary charges for a tracking Time Projection Chamber (TPC) in high energy physics (HEP). The goal is to develop an ion backflow-less TPC detector to overcome the major drawback of this detector type for future HEP applications. Back drifting ions are inhomogeneous space charges that can distort the'next incoming electron clouds. With the purpose of performing high-resolution spectrometry of low energy X-rays, detector designs exploiting electroluminescence in noble gases were developed in Coimbra and CERN. Here the primary charges are not amplified by ionising, but exciting the gas atoms. This forms dimers between the noble gas atoms. When the dimers decay they emit photons with a gas specific wavelength, which is typically in the deep uv region.
We want to adapt this concept for for high rate tracking TPCs. This requires to add an quencher to the noble gas that on the one hand reduces the light yield, but on the other hand increases to drift velocity of the electrons in the gas to typical values for tracking TPCs. We have designed a demonstrator detector and a gas system to measure the reduction of light yield as a function of the amounts of quencher. The drift velocity can be calculated using the software package Garfield+. A list of suitable gas mixtures that will be evaluated with the prototype, as well as, first results will be presented.

HK 27.82 Di 16:45 F Foyer

Untersuchungen zur Bestimmung von absoluten Folienabständen bei Plungermessungen — •Marcel Beckers, Alfred Dewald, Thomas Braunroth, Julia Litzinger und Claus Müller-Gatermann — Institut für Kernphysik, Universität zu Köln, Köln

Unter bestimmten experimentellen Bedingungen wird bei der Auswertung von RDDS-Messungen die Kenntnis der absoluten Fluglänge und damit des absoluten Abstandes zwischen Target- und Stopperfolie im Plunger notwendig. Unsicherheiten bei dessen Bestimmung führen in der Folge zu teils deutlichen Unterschieden in den extrahierten Lebensdauern. Die gebräuchliche Methode der Abstandsbestimmung über eine Kapazitätsmessung nach Alexander und Bell [1] wird in der Praxis durch systematische Fehler, etwa durch Streukapazitäten, beeinträchtigt.
Um die dadurch entstehenden Unsicherheiten zu minimieren, wurde der Einsatz eines geerdeten Ringes zwischen den Folien untersucht, der den Einfluss dieser Kapazitäten verringern soll. Außerdem wurde die Verwendung einer direkten Methode der Abstandsbestimmung überprüft, bei der Kontaktpunkte zwischen den Folien und einer Nadelspitze bestimmt werden. Die Ergebnisse dieser Untersuchungen und mögliche Folgeprojekte sollen vorgestellt werden. Dieses Projekt wurde gefördert von der DFG, Fördernummer DE 1516/3-1.
[1] T. K. Alexander, A. Bell, *Nucl. Instr. Meth.* **81** (1970).

HK 27.83 Di 16:45 F Foyer

Target thickness distribution studies using the $\overline{\text{P}}$ANDA cluster-jet target — •B. Hetz, D. Bonaventura, S. Grieser, A.-K. Hergemöller, A. Khoukaz, E. Köhler, and M. Matthias — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany

The internal cluster-jet target build up at the University of Münster will be the first of the two planned targets for the upcoming $\overline{\text{P}}$ANDA experiment at the antiproton accelerator and storage ring HESR at FAIR. This cluster-jet target in close to $\overline{\text{P}}$ANDA geometry including vacuum and beam monitor systems and the final beam dump for the $\overline{\text{P}}$ANDA experiment is by now succefully set into operation.
Since main interest is put on antiproton-proton interaction at the experiment, the properties of the used hydrogen target cluster beam are from highest interest. Studies on the areal and volume thickness distributions inside the cluster beam revealed regions of higher thickness inside the beam itself, so called core beams. This core beams allow target thicknesses up to more than $\rho \approx 10^{15}$ atoms/cm^2 after two meters from the nozzle. The automated control of skimmer, collimator and a special spherical joint allow to extract parts of the beam. Additionally other means of control given by used gas stagnation conditions enable the possibilty for a continous variation of the target thickness during operation mode.
The devices for this density structure studies using the automated control of the $\overline{\text{P}}$ANDA cluster-jet target and first results will be presented.

HK 27.84 Di 16:45 F Foyer

A laser ablation carbon cluster ion source for MR-TOF-MS — •Christine Hornung[1], Timo Dickel[1,2], Hans Geissel[1,2], Florian Greiner[1], Wolfgang Plass[1,2], Ann-Kathrin Rink[1], and Christoph Scheidenberger[1,2] — [1]Justus-Liebig Universität Gießen, Germany — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The FRS Ion Catcher at GSI serves as test facility for the future Low-Energy Branch of the Super-FRS at FAIR. Here, short-lived nuclei produced and in-flight separated in the FRS and thermalized in a cryogenic stopping cell and identified and measured with high accuracy in a multiple-reflection time-of-flight mass spectrometer (MR-TOF-MS).

For calibration and systematic studies of the MR-TOF-MS calibrants over a broad mass range and close to the ions of interest are essential. For this purpose a new diagnostics unit including a laser ablation carbon cluster ion source and a dedicated RFQ mass filter has been designed, commissioned and tested. The system can be operated at repetition rates that are two orders of magnitude higher (100 Hz) than existing systems and is thus ideally suited for the needs of the MR-TOF-MS (cycle frequency ∼100 Hz). Several measures (small laser spot size, special ion optics, x-y-movable targettable) have been taken into account to ensure long term stable operation (∼weeks) at the highest repetition rate. Results of the commissioning and first tests with different targets will be presented.

HK 27.85 Di 16:45 F Foyer

Status of the Precision High Voltage Divider for CRYRING — •V. Hannen[1], W. Nörtershäuser[2,3], H.-W. Ortjohann[1], O. Rest[1], Ch. Weinheimer[1], and D. Winzen[1] — [1]Institut für Kernphysik, Uni Münster — [2]Technische Universität Darmstadt — [3]GSI, Darmstadt

To cool ion beams in the heavy ion storage ring CRYRING and thus achieve a low momentum spread, CRYRING features an electron cooler, where the ion beam is superimposed with a monoenergetic electron beam. In order to calculate the velocity of the electrons and therefore of the cooled ion beam, it is mandatory to continously monitor the cooler voltage with a high-precision divider. For that purpose a high-precision voltage divider for voltages up to 35 kV is currently being constructed in Münster, similar in design to the ultrahigh-precision voltage dividers in use at the KATRIN experiment. The precision of the divider will be in the low ppm range and will, if other sources of systematic uncertainties like e.g. space charge effects are under control, allow for measurement uncertainties in the $< 10^{-5}$ region. Special care is taken to ensure a fast time response of the divider, for measurements where the cooler voltage is modified in regular intervals.

This project is supported by BMBF under contract number 05P15PMFAA. D. Winzen thanks HGS-HIRe for FAIR for funding his scholarship.

HK 27.86 Di 16:45 F Foyer

A slow control and TDC calibration system for the HADES RICH upgrade * — •Adrian Amatus Weber[1], Peter Zumbruch[2], and Jan Michel[3] for the HADES-Collaboration — [1]Justus-Liebig-Universität Gießen — [2]GSI Darmstadt — [3]Goethe-Universität Frankfurt

The HADES experiment is a high resolution dilepton spectrometer at the SIS18 accelerator of GSI. One of the goals of the Ring-Imaging Cherenkov Detector (RICH) is to identify electron-positron pairs. To enhance the detector performance new multianode photomultipliers from the CBM-collaboration will be used to replace the existing gaseous photo detectors.

Therefore a new EPICS based slow control system is being developed. This system is used to control the TDK Lambda low voltage and the ISEG high voltage power supplies of the RICH detector. It is also used for temperature and humidity monitoring inside and outside the detector with DS18B20 and HDC1000 sensors.

The readout of the RICH detector is done by DiRICH modules. The modules consist of FPGA based TDCs. To cope with high time precision, an online calibration will be implemented. The status of this work will be shown.

* supported by BMBF(05P15RGFCA)

HK 27.87 Di 16:45 F Foyer

Development of an automatic calibration routine for the preamplifier of the electromagnetic calorimeter for PANDA at FAIR — A. Ahmed[1,2], A. Aycock[1,2], L. Capozza[1], A. Dbeyssi[1], B. Fröhlich[1,2], •P. Grasemann[1,2], S. Haasler[1,2], D. Izard[1], D. Khaneft[1,2], J. Köhler[1,2], F. Maas[1,2,3], M. Carmen Mora Espí[1], O. Noll[1,2], D. Rodríguez Piñeíro[1], J. Jorge Rico[1], S. Wolff[1,2], M. Zambrana[1,2], and I. Zimmermann[1,2] for the PANDA-Collaboration — [1]Helmholtz-Institut Mainz, Mainz, Germany — [2]Institute of Nuclear Physics, Mainz, Germany — [3]PRISMA Cluster of Excellence, Mainz, Germany

The PANDA experiment will be one of the key projects of the new accelerator facility FAIR in Darmstadt. With its mature detector system, it will be able to observe a variety of physical channels. Thus, it will make a huge contribution to the understanding of the strong interaction. The electromagnetic process group (EMP) in Mainz is developing the backward end-cap (BWEC) of the electromagnetic calorimeter (EMC). The EMC produces scintillation light which is detected by Avalanche Photodiodes. The charge is collected and amplified by the so-called APFEL-ASIC preamplifier. To fit the ASIC signals to the operating area of the ADC, it is possible to set reference voltages at the preamplifier. Considering that the BWEC itself has 524 crystals with 2096 signals in total, an automatic process to get the signals into this operating area is necessary. On my poster I will point out a routine to set the reference voltages of the preamplifier automatically and explain the device for the implementation of the routine.

HK 27.88 Di 16:45 F Foyer

A database program for the search for nuclides of interest in nuclear physics experiments — •Christian Will[1], Florian Greiner[1], Julian Bergmann[1], Timo Dickel[1,2], Jens Ebert[1], Hans Geissel[1,2], Lars Liebschwager[1], Wayne Lippert[1], Wolfgang Plass[1,2], Moritz Pascal Reiter[1,3], and Christoph Scheidenberger[1,2] for the FRS Ion Catcher-Collaboration — [1]JLU Giessen, Germany — [2]GSI, Darmstadt, Germany — [3]TRIUMF, Vancouver, Canada

Mass and lifetime measurements of exotic nuclei yield key information for the understanding of nuclear structure and the nucleosynthesis. These measurements are subject to experimental boundary conditions such as beam intensity and production cross sections. Additionally, databases for nuclear properties of known and expected isotopes have thousands of entries, thus making a candidate search by hand practically impossible. Due to this reason, a database program has been developed which allows the import and combination of several databases such as NUBASE, ENSDF, and production yields or models. The program provides both common table tools as well as many physics related tools, for instance it is possible to calculate EPAX cross sections. To automate the program, a simple script language and a log-function have been implemented. The resulting output can be exported in different formats, including a direct re-import and visualisation in Nucleus Win. The findings of a candidate search have already been used for the preparation of different experiments, including an experiment with the FRS Ion Catcher at GSI in 2016.

HK 27.89 Di 16:45 F Foyer

Damages of plunger targets due to swift heavy ion irradiation — •Christoph Fransen, Andrey Blazhev, Thomas Braunroth, Alfred Dewald, Alina Goldkuhle, Claus Müller-Gatermann, Dorothea Wölk, and Karl-Oskar Zell — Institut für Kernphysik, Universität zu Köln

For lifetime measurements of excited nuclear states with the recoil distance Doppler-shift (RDDS) method and the plunger target foils with very good surface qualities, i.e., roughnesses in the micrometer range, are often essential. Therefore, these targets are typically stretched over highly precisely made cones and careful estimates on the target temperature in the beam spot are required to avoid the formation of bumps in these foils due to beam-induced heating up caused by the energy transfer. However, when performing RDDS experiments with heavy ion beams with energies of several MeV/u an additional effect must be considered: the sensitivity of several (metallic) target materials to the electronic stopping power (S_e) of swift heavy ions causing structural changes [1]. This effect is known in material science since several years, but in RDDS experiments it was only observed in very recent experiments by our group where extreme wrinkles appeared in some target foils with amplitudes of the order of 100 μm. Such can hamper a RDDS measurement completely. Based on the results and predictions in [1,2] we will discuss these observations with respect to the choice of target materials including the use of multilayer targets.

[1] Z.G. Wang, et al., J. Phys. Condens. Matter 6 (1994) 6733
[2] M. Toulemonde et al, Nucl. Instr. Meth. B 277 (2012) 28

HK 27.90 Di 16:45 F Foyer

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

Das CALIFA Kalorimeter mit seinen etwa 2600 Szintillationskristallen ist eine der wesentlichen Komponenten des R^{3}B-Experiments. Für viele Experimente muss CALIFA komplexe Trigger-Entscheidungen mit einer minimalen Latenz ($< 1\,\mu$s) treffen. Hier ist die Auswahl von bestimmten Triggermustern ein wesentliches Werkzeug zur präzisen Vorauswahl von relevanten Ereignissen.

Triggertypen, Energiesummen und Multiplizitäten werden in einer sternförmigen Architektur vom gesamten Detektor eingesammelt. Schnelle FPGAs fassen dabei die anfallenden Daten zusammen und senden die Ergebnisse an die nächsthöhere Ebene. Parallel dazu erzeugen sie spezielle Triggerereignisse im Datenstrom. Wir haben erste Prototypen für die FEBEX (GSI) Plattform entwickelt und im Labor getestet. Gefördert durch BMBF (05P15WOFNA).

HK 27.91 Di 16:45 F Foyer

Magnetically driven piston pump for the XENON1T experiment — •Denny Schulte, Axel Buss, Alexander Figuth, Christian Huhmann, Michael Murra, Hans-Werner Ortjohann, and Christian Weinheimer — Westfälische Wilhelms-Universität, Münster, Germany

The XENON1T experiment, constructed in the Laboratori Nationali del Gran Sasso (LNGS) in Italy, uses a dual-phase xenon Time Projection Chamber (TPC) for the direct detection of the Weakly Interacting Massive Particle (WIMP). The TPC is filled with pure xenon and is geared towards scattering of WIMPs with xenon nuclei. In order to reach the desired high sensitivity of $2 \cdot 10^{-47}$ cm^2 for a 50 GeV/c^2 WIMP, a high purity of the xenon is crucial. According to that, the xenon has to be kept extremely clean of electro-negative impurities and radioactive backgrounds. For this purpose, the xenon must be continously circulated through the purification system. Therefore, a convenient pump out of high purity components, e.g. for a low radon emanation, has been developed in Münster in cooperation with the nEXO group at Stanford University and the nEXO/XENON group at Rensselaer Polytechnic Institute. With this pump both extremely cleanness and saveness with respect to contamination of the xenon can be reached by the magnetically driven piston and the hermetically sealing. This poster will deal with the current status of this magnetically driven piston pump and the set of problems in longterm stability represented by heat evolution and gasket design. This project is supported by BMBF under contract 05A14PM1.

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Development of the focal plane detectors for the NEPTUN photon tagger — •Yevhen Kozymka[1], Thomas Aumann[1,2], Martin Baumann[1], Michael Beckstein[1], Norbert Pietralla[1], Heiko Scheit[1], Dmytro Symochko[1], and Sebastian Vaupel[1] — [1]Institut für Kernphysik TU Darmstadt, Darmstadt, Germany — [2]GSI, Darmstadt, Germany

The low energy photon tagging facility NEPTUN currently undergoes the major upgrade aimed to significantly improve overall performance of the setup. Upgraded tagger will be able to operate with 70 MeV electron beam and will have extended focal plane with energy bite of around 35 MeV. After completion of upgrade it will be possible to perform total dipole response measurement in the energy region 5-35 MeV for one target using single settings of the spectrometer.

The poster is going to address the design and testing of the new focal plane detector array.

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The common GBTX based prototype readout board for CBM — •Jörg Lehnert for the CBM-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The Compressed Baryonic Matter (CBM) experiment at FAIR is a fixed target heavy ion experiment planned to operate at high interaction rates up to 10 MHz using self-triggering frontend electronics.

The readout chains for most subsystems in CBM consist of: (1) detector specific frontend boards with custom ASICs, (2) readout boards (ROB) for data aggregation from many electrical links and conversion to optical data transmission, and (3) common FPGA based data processing boards (DPB) for data preprocessing, time slice building and interfacing to slow and fast control.

Several CBM subsystems will employ ROBs based on the radiation hard GBTX data aggregation ASIC and the Versatile Link optical modules developed at CERN.

A common CBM prototype readout board (C-ROB) has been developed providing the full GBTX and Versatile Link functionality needed by all systems to readout moderately sized detector assemblies in laboratory and beam tests. It implements 3 GBTX ASICs, one GBT-SCA slow control ASIC and one VTRx and VTTx module each, and provides 42 320 Mb/s frontend readout links on an FPGA mezzanine card (FMC) connector.

The concept, realization and current status of the C-ROB will be presented.

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First characterization of the PASTA chip for the microstrip part of the PANDA MVD — •Alberto Riccardi[1], Kai-Thomas Brinkmann[1], Daniela Calvo[2], Valentino Di Pietro[1], Alessandra Lai[3], Tommaso Quagli[1], James Ritman[3], Angelo Rivetti[2], Manuel Rolo[2], Robert Schnell[1], Tobias Stockmanns[3], Richard Wheadon[2], André Zambanini[3], and Hans-Georg Zaunick[1] for the PANDA-Collaboration — [1]II. Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen, Germany — [2]INFN Sezione di Torino, Torino, Italy — [3]Forschungszentrum Jülich GmbH, Jülich, Germany

PANDA is a key experiment of the future FAIR facility, under construction at Darmstadt, Germany. The Micro Vertex Detector (MVD) is the innermost component of the experiment and its main task is to reconstruct the primary and secondary vertexes.

The PASTA (PAnda STrip ASIC) chip has been developed to read out the strip sensors of the MVD and its architecture is based on the Time-over-Threshold technique. Time to Digital converters with analog interpolators are used to obtain a very good time resolution with low power consumption.

A first full-size prototype was produced in a commercial 110 nm technology and is currently under test. An overview of the chip, of its readout systems and of the first results of its characterization will be presented.

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HK 27.95 Di 16:45 F Foyer

Signal time reconstruction for GEM detectors read out by the APV chip — •Rocio Reyes Ramos, Mikhail Mikhasenko, and Bernhard Ketzer — Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, 53115 Bonn, Germany

The APV25 chip is an analog sampling ASIC that preamplifies the signals on each of its 128 input channels and samples them into a 160-cell switched capacitor array. Upon reception of a trigger signal, the sample values corresponding to a predefined latency are multiplexed and sent to a pipelined ADC for digitization.

While the chip was designed for Silicon microstrip detectors for the CMS experiment, they are also used for COMPASS GEM detectors, where 3 samples on the leading edge of the signal separated by 25 ns are read out. A pulse-shape analysis technique is used to reconstruct the signal time from the three samples taking into account the known signal shape. The time calibration of the system is performed by scanning the signal shape using different latencies. It is based on calculating sample amplitude ratios as a function of the trigger latency, corrected by the relative phase of the synchronized trigger signal and the passage of the particle. A Gaussian fit is performed over slices perpendicular to the time axis. Finally a phenomenological function representing the signal shape is fitted over the Gaussian mean values.

Recent improvements of the method like smearing of digital values (considering resolution and dynamic range of the ADCs) and removing large signals (saturating the dynamic range of the chip) will be shown.

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