HK 67: Poster Session

Time: Thursday 14:00–16:00 Location: Audi-Max

HK 67.1 Th 14:00 Audi-Max

Spectroscopy of Exotics at PANDA — •Bernhard Roth — Ruhr-Universität Bochum, 44780 Bochum

With the PANDA experiment at the future facility FAIR in Darmstadt $\bar{p}p$ annihilations will be investigated with very high luminosity and highest precision over a wide $\bar{p}$ momentum range of $1.5-15\mathrm{GeV}/c$. One of the main topics of the physics program is the spectroscopy of hadrons including the search for exotic matter. Exotic glue ball states are predicted by QCD based models and lattice QCD calculations. The $f_0(1500)$, observed in $\bar{p}p$ annihilation by the Crystal Barrel Collaboration at LEAR and others, is debated to be an admixture of the glue ball ground state and conventional $\bar{q}q$ states. Motivated by this observation it is believed that gluon rich processes in $\bar{p}p$ annihilation events are a good source for the production of glue balls. In conjunction with the ability of the PANDA detector to reconstruct final states including charged and neutral particles with good coverage of the solid angle, this offers excellent opportunities for the search for glue balls. In particular higher mass states are accessible with PANDA. Here the results of Monte Carlo studies of the production of glue balls in the mass range of $2400-3700\mathrm{MeV}/c^2$ decaying to $\phi\phi$ in exclusively reconstructed $\bar{p}p \to \phi\phi\pi^0$ and $\bar{p}p \to \phi\phi\eta$ events are presented.
This work is funded by the bmb+f and the European Union.

HK 67.2 Th 14:00 Audi-Max

Simulation of the $p\bar{p} \to D_s^{\pm} D_s^*(2317)^{\mp}$ reaction within the pandaroot framework — •Vishwajeet Jha, Albrecht Gillitzer, and Jim Ritman for the PANDA-Collaboration — IKP, Forschungszentrum, Jülich, Germany

The discovery of the surprisingly light and narrow open charm meson states, such as $D_s^*(2317)$ and $D_s(2460)$, have questioned the vailidity of the "naive quark potential model"to describe these states. The intrinsic width of these states are small enough, so that only the upper limits have been measured ($\Gamma \leq 4.6$ MeV and $\Gamma \leq 5.5$ MeV for the $D_s^*(2317)$ and $D_s(2460)$, respectively). The PANDA experiment at FAIR will provide a suitable environment to measure the width of these states with much higher precision because of the high quality phase space cooled antiproton beam.

Simulations have been performed for the reaction, $p\bar{p} \to D_s^{\pm} D_s^*(2317)^{\mp}$, within the PANDAROOT framework. Due to the low formation cross section, full reconstruction of the event is not experimentally feasible with sufficient statistics in a resonable time. Instead, by reconstructing the D_s meson in the $D_s^{\pm} \to \phi\pi^{\pm}(\phi \to K^+K^-)$ decay mode, and tagging only some of the decay products of $D_s^*(2317)$, a sufficiently precise measurement of the width can be performed. We perform a study of possible background channels due to the decay of the binary product D_s and also the generic background due to other $p\bar{p}$ reactions.
This work has been supported in part by grants from the Indo-German bilateral agreement and FZ jülich.

HK 67.3 Th 14:00 Audi-Max

Overview of the PANDA Grid — •Rene Dosdall[1], Dan Protopopescu[2], and Kilian Schwarz[3] — [1]IKP, Forschungszentrum Juelich — [2]University of Glasgow — [3]GSI Darmstadt

PANDA is one of the main experiments at the new FAIR facility and will investigate the properties of hadrons in the charm quark mass region produced in antiproton annihilation reactions.

The PANDA experiment will produce a large amount of data (˜1 PByte/year) and the analysis will require the continuous use of several hundred CPUs. To accomplish this Grid Computing (distributed Analysis/Storage of Data) is needed.

The PANDA Grid provides access to the required computing infrastructure for large scale simulations during the detector development phase and later for the data analysis. Access to the Grid is realized with the middleware AliEn which is developed at CERN.

For testing two data challenges of one week each and up to 10 institutions participating have taken place.

This report will present the structure and performance of the PANDA Grid system.

Supported in part by the EU and FZ-Juelich

HK 67.4 Th 14:00 Audi-Max

Multimeson Production in Proton-Proton Collisions with WASA-at-COSY [∞] — •Benedykt R. Jany for the WASA-at-COSY-Collaboration — Institute of Physics, Jagiellonian University, PL-30059 Cracow, Poland — Institut für Kernphysik and Jülich Center for Hadron Physics, D-52425 Jülich, Germany

The direct multimeson production channels in the region of narrow mesonic states (like ω, η') cause the main background contribution for studies of meson production and decays. For a meaningful investigation of those, it is essential to know the cross sections and dynamics of such processes, especially since such multi-meson background processes are not yet well investigated both experimentally and theoretically.

Preliminary results on $3\pi^0$ and $2\pi^0\eta$ final states measured in proton-proton collisions at a proton incident energy $T = 2.54$ GeV by the WASA-at-COSY detector will be presented.

[∞] Supported by FZ Jülich, BMBF and Wallenberg Foundation

HK 67.5 Th 14:00 Audi-Max

Strangeness production with WASA-at-COSY* — •Anna Kowalczyk for the WASA-at-COSY-Collaboration — Institute of Physics, Jagiellonian University, PL-30059 Cracow, Poland — Institute für Kernphysik and Jülich Center for Hadron Physics, D-52425 Jülich, Germany

The hyperon spectrum is still not understood in detail. In particular the $\Lambda(1405)$ state has received increased attention recently, since its nature is debated heavily and controversely. Various theoretical investigations predict for this possibly dynamically generated state even a two-pole structure. This calls for detailed investigations of the production cross sections and the decay channels as a function of the excitation energy.

To this aim we have started a feasibility study for measurements of the production and the decay of hyperon states with WASA at COSY. The project starts with the investigation of ground state Σ production in the reaction channel $pp \to p\Sigma^+(1189)K^0$, with the mostly neutral final state involving 3 pions: $pp \to p\Sigma^+K^0 \to p(p\pi^0)(\pi^0\pi^0)$.

The current status of the analysis of data collected in 2008 will be presented.

* Supported by FZ Jülich, BMBF, and Wallenberg Foundation.

HK 67.6 Th 14:00 Audi-Max

Complete electric dipole response in ^{120}Sn: a test of the resonance character of the pygmy dipole resonance — •Anna Maria Heilmann for the EPPS0-Collaboration — Institut für Kernphysik, Technische Universität Darmstadt, Germany

In high-resolution (p,p′) experiments under 0° the complete B(E1) strength distribution can be studied in stable nuclei. At RCNP Osaka, Japan, angular distributions including 0° and polarization transfer observables for E1 excitations in ^{120}Sn were measured in an excitation energy range of 5–25 MeV. The systematics of the pygmy dipole resonance in stable Sn isotopes has been recently studied at the S-DALINAC[1]. From this study it was conclused that knowledge of the complete E1 response would be important to differentiate between relativistic an nonrelativistic QRPA models predicting largely different properties of the pygmy dipole resonance. Data analysis and first results on the E1 strength will be presented.
[1] B.Özel, Ph.D. Theses, University of Cukurova (2008).
* Supported by the DFG through SFB 634 and 446JAP 113/267/0-2.

HK 67.7 Th 14:00 Audi-Max

EGoS - an observable for centrifugal stretching — •Jacob Beller[1], Norbert Pietralla[1], and Thomas Pissulla[2] — [1]IKP TU Darmstadt — [2]IKP Koeln

A systematic investigation of the ground-state bands of deformed nuclei using EGoS-plots (E_γ over Spin $= E_\gamma(J \mapsto J-2)/J$) has been done. Many nuclei show a maximum in the EGoS-plot, which is neither expected for rigid rotors nor for vibrational nuclei. Therefore, two potentials within the geometric collective model, namely the Confined-β-Soft rotor model (CBS) [1] and the Davidson-potential [2], were used to describe the data. Good agreement between the CBS and experimental data is achieved for all nuclei, while the Davidson-potential and the data differ near the critical point solution X(5) [3]. Here the wavefunc-

tions obtained from the Davidson-potential show stronger centrifugal stretching than the CBS-wavefunctions in disagreement with the data.

We conclude that EGoS-plots show a particular and easy-to-obtain sensitivity to the phenomenon of centrifugal stretching.

[1] N. Pietralla and O.M. Gorbachenko, Phys. Rev. C **70**, 011303(R) (2004)

[2] P.M. Davidson, Proc. R. Soc. London, Ser. A **135**, 459 (1932)

[3] F. Iachello, Phys. Rev. Lett. **85**, 3580 (2001)

HK 67.8 Th 14:00 Audi-Max

The simulation software for the Panda MVD — •Ralf Kliemt[1,2], Tobias Stockmanns[3], Kai-Thomas Brinkmann[1,2], Rene Jäkel[1,2], and Oscar Reinecke[1,2] for the PANDA-Collaboration — [1]IKTP, Technische Universität Dresden, Germany — [2]HISKP, Rheinische Friedrich-Wilhelms-Universität Bonn, Germany — [3]Forschungszentrum Jülich, Germany

The Micro-Vertex-Detector (MVD) is the innermost detector part of the PANDA experiment, one of the key projects at the future FAIR facility at GSI, Darmstadt. A flexible software simulation inside the PandaRoot framework has been set up to support the ongoing hardware and detector design developments for the MVD. Aside from the application of particle transport codes like Geant it features a realistic detector emulation and reconstruction code which is supposed to be applied on real detector data later on. This includes the detailed description of the detector geometry, the expected data formats, sophisticated clustering algorithms and the integration of the MVD reconstruction algorithms in the track reconstruction. (Supported by BMBF and the EU)

HK 67.9 Th 14:00 Audi-Max

SU(3) classification of baryon states — •Maxim Polyakov — Institut für Theoretische Physik II, Ruhr-Universität Bochum

We review the spectrum of all baryons with the mass less than approximately 2000-2200 MeV using methods based on the approximate flavor SU(3) symmetry of the strong interaction. The application of the Gell-Mann–Okubo mass formulae and SU(3)-symmetric predictions for two-body hadronic decays allows us to successfully catalogue almost all known baryons in twenty-one SU(3) multiplets. This classification allows us to make predictions for new baryonic states and excludes some of claimed in the literature baryons.

HK 67.10 Th 14:00 Audi-Max

Search for $a_0/f_0(980)$ production in $pd \to {}^3\mathrm{He}\pi^0\eta/\pi^0\pi^0$ reactions with WASA-at-COSY — Markus Büscher[1], Pavel Fedorets[1,2], and •Chuan Zheng[1,3] for the WASA-at-COSY-Collaboration — [1]Institut für Kernphysik and Jülich Center for Hadron Physics, Forschungszentrum Jülich, D-52425 Jülich, Germany — [2]Institute for Theoretical and Experimental Physics, Bolshaya Cheremushkinskaya 25, 117218 Moscow, Russia — [3]Institute of Modern Physics, Chinese Academy of Sciences, 730000 Lanzhou, China

The WASA-at-COSY facility is well suited to detect both strong ($\pi\eta$ and $\pi\pi$) and radiative (γV, with V being a vector meson) decays of the light scalar mesons $a_0/f_0(980)$. As a first test measurement, and in order to determine the light-scalar production cross sections in the $pd \to {}^3\mathrm{A}X$ process, the $pd \to {}^3\mathrm{He}(4\gamma)$ reaction has been measured. At a beam momentum of P_p=2.935 GeV/c masses M_X of up to 1.2 GeV/c^2 could be produced. We report on the status of the data analysis, in particular for the reaction channels $pd \to {}^3\mathrm{He}\ a_0 \to {}^3\mathrm{He}(\pi^0\eta)$ and $pd \to {}^3\mathrm{He}\ f_0 \to {}^3\mathrm{He}(\pi^0\pi^0)$.

*Supported by FZ Jülich, BMBF, Wallenberg Foundation, CSC and HGF

HK 67.11 Th 14:00 Audi-Max

Fast signal analysis for the PANDA Electromagnetic Calorimeter — •Elmaddin Guliyev, Myroslav Kavatsyuk, and Herbert Löhner for the PANDA-Collaboration — Kernfysisch Versneller Instituut, Zernikelaan 25, 9747 AA Groningen, The Netherlands

Antiproton-proton annihilations at the future FAIR facility at Darmstadt, Germany, will allow testing the theory of strong interactions, QCD, in the non-perturbative regime. The PANDA detector will be installed in the antiproton storage ring HESR providing an intense high-resolution antiproton beam with dense internal targets. The Electromagnetic Calorimeter (EMC) is a crucial component to provide high sensitivity for studies of charm-quark mesons, glue-balls and hybrid states. The EMC employs fast bright PWO scintillation crystals with Large-Area Avalanche Photo Diodes (LAAPD) as photo sensors. Low-noise low-power preamplifiers were developed suitable for the expected high rates and the required large dynamic range of photon energy deposition between 1 MeV and 12 GeV. Measurements were performed on signals from cooled PWO crystals equipped with LAAPD and either discrete or ASIC preamplifiers, recorded by a fast sampling ADC. Sampling rate and ADC resolution have been determined for achieving the required energy and timing performance. The concept of the EMC front-end electronics will be discussed, including a fast feature extraction algorithm. Results of recent prototype studies will be presented.

HK 67.12 Th 14:00 Audi-Max

Non-Singlet spin structure function in valon model — •fatemeh taghavi shahri[1] and firooz arash[2] — [1]School of Particles and Accelerators,IPM(Institute for Studies in Theoretical Physics and Mathematics), P.O.Box 19395-5531, Tehran, Iran — [2]department of physics,tafresh University,Tafresh

We present a Next-to-leading order QCD calculation of non-singlet spin structure function $g_1^{NS}(x,Q^2)$, of the nucleon in the so-called the valon representation. The structure of the valon itself develops through the perturbative dressing of a valence quark in QCD, which is independent of the hosting hadron. The results of this calculations are in excellent agreement with the experimental data from HERMES collaborations for the entire measured range of x. It also provides an acceptable agreement with the older data from SMC, E143 and E155 experiments. We have further compared our results with those from AA, BB, GRSV, and DNS global fits.

HK 67.13 Th 14:00 Audi-Max

Proton scattering at ^{92}Zr and the investigation of a possible g-boson configuration — •Christopher Walz, Oleksiy Burda, Peter von Neumann-Cosel, and Norbert Pietralla — IKP, TU Darmstadt, Germany

The concept of fully symmetric (FS) and mixed-symmetric (MS) quadrupol phonons as building blocks of low-energy structure in spherical nuclei has been investigated in recent years. The nucleus ^{92}Zr is a well studied example and candidates for the FS and MS quadrupol one-phonon states with $J^\Pi = 2^+$ have already been established [1]. High-resolution-^{92}Zr(p,p') experiments at 200 MeV were performed at the iThemba LABS in order to study the excitations of low-spin states. The evaluation of the measured cross sections as a function of momentum transfer had supported the one-phonon interpretation of symmetric and mixed-symmetric 2^+ states. In addition the measured momentum-transfer dependence of (p,p') cross sections permits a test of the nature of the 4_1^+ and 4_2^+ states as candidates of possible g-boson configuration with precluminant FS and MS character. Comparisons to QPM and shell model calculations is presented.

[1] C.Fransen *et al*, Phys. Rev. C 71, 054304 (2005)

HK 67.14 Th 14:00 Audi-Max

Search for new Charmonium(-like) States and Anti-Nuclei at Belle — Sabrina Darmawi, Martin Galuska, Wolfgang Kühn, Stephanie Künze, •Jens Sören Lange, Thomas Sander, and Matthias Ullrich for the Belle-Collaboration — II. Physikalisches Institut, Justus-Liebig-Universität Giessen

At the Belle experiment at KEK, Tsukuba, Japan, e^+e^- collisions at center-of-mass energies from $\sqrt{s}$=9.46 to 10.86 GeV are investigated. Results from searches for new charmonium and charmonium-like states will be presented, in particular *(a)* search for the Y(4260) state in B meson decays, *(b)* search for the $^3D_2$ (L=2) charmonium state, and *(c)* search for the η_b in Upsilon(3S,4S,5S) decays. Furthermore, preliminary results of the search for anti-deuterons and anti-tritons will be presented, which - as events with 6 or 9 anti-quarks, respectively - are rare events in e^+e^- collisions.

HK 67.15 Th 14:00 Audi-Max

Coupled-Channel Dynamics For Quarkonium Systems — •Ying Cui, Alexander Laschka, and Wolfram Weise — Institut für Theoretische Physik T39, Technische Universität München, D-85747 *Garching, Germany

We investigate charmonium ($c\bar{c}$) and bottomonium ($b\bar{b}$) coupled to the meson-meson system ($D\bar{D}$ and $B\bar{B}$). Using the bound state wavefunctions computed with a $Q\bar{Q}$ potential derived from perturbative and lattice QCD, we calculate the corrections to the binding energies of charmonium and bottomonium states arising from their coupling to the two-meson continuum. The interaction vertex between the mesons and the heavy-light states is obtained from heavy quark effective field

theory. This is different from the $^3P_0$ model, which assumes that the light quark pair is created from the vacuum. We also study the decay widths and wavefunction renormalization factors of heavy quark-antiquark bound states.
Work supported in part by BMBF and GSI.

HK 67.16 Th 14:00 Audi-Max

Diffractive Dissociation into 3 Pion Final States at COMPASS — Suh-Urk Chung[1,2], Jan Friedrich[1], Stefanie Grabmüller[1], •Florian Haas[1], Bernhard Ketzer[1], Sebastian Neubert[1], Stephan Paul[1], Dimitry Ryabchikov[1,3], and Quirin Weitzel[1] for the COMPASS-Collaboration — [1]Technische Universität München, Physik Department E18, 85748 Garching, Germany — [2]Brookhaven National Laboratory, Upton, NY 11973, USA — [3]Institute for High Energy Physics, 142284 Protvino, Russia

Diffractive dissociation reactions at the COMPASS experiment, CERN, provide access to the meson resonance spectrum. During a pilot run in 2004, using a pion beam on a lead target, a competitive number of $\pi^-\ \pi^-\ \pi^+$ final state events with masses below 2.5 GeV/c^2 were recorded. After COMPASS had finished its muon program in 2007, it used in 2008 again a pion beam, but now a liquid hydrogen target, and gathered during several weeks a unique high statistics. A full partial wave analysis of the 2004 data has been performed, with the focus on the kinematic range of a large momentum transfer (0.1 GeV^2/c^2 $\leq$ t' $\leq$ 1.0 GeV^2/c^2). In addition first results of the adjacent analysis with 2008 data will be presented.

HK 67.17 Th 14:00 Audi-Max

A pattern recognition analysis for particle identification with PANDA — •Vanniarajan Suyam jothi for the PANDA-Collaboration — KVI, Groningen, Netherlands

The PANDA project at the future Facility for Antiproton and Ion Research, FAIR, Darmstadt, will study hadronic excitations in the charmonium-mass range exploiting antiproton-proton annihilations. A compact multi-purpose detector will be employed which is capable of measuring the scattering angles, momenta, and energies of charged and neutral particles. In addition, the detector will be able to separate the different particle types and perform high-quality Particle IDentification (PID). A pattern-recognition tool based on a set of multi-variate analysis techniques has been developed and used to optimize the quality and performance of PID. The tool is part of the simulation and analysis framework carrying the name PandaRoot, which is presently being developed for physics-benchmark and detector-design studies. This paper will present first results of the analysis which are based on a Monte-Carlo simulation describing the complete detector setup.

HK 67.18 Th 14:00 Audi-Max

Compton scattering sum rules for electromagnetic moments of higher-spin targets — •Jan Pieczkowski, Vladimir Pascalutsa, and Marc Vanderhaeghen — Institut für Kernphysik, Johannes-Gutenberg-Universität, 55099 Mainz

In 1965, a sum rule for the anomalous magnetic moment of nucleons in doubly-polarized Compton scattering was derived by Gerasimov and by Drell and Hearn (GDH). It is a fundamental relation in dispersion theory of QCD, based on properties of the amplitude, such as analyticity and crossing symmetry. For the derivation, the low-energy theorem by Low, and Gell-Mann and Goldberger, as well as the optical theorem is applied. For $S \geq \frac{1}{2}$ particles higher order anomalous moments become relevant. In this work, we focused on massive $S = 1$ particles. Using a generalized decomposition of the polarized forward Compton scattering amplitude for arbitrary spin S, we were able to obtain sum rules for anomalous magnetic and quadrupole moments. The method of derivation of arbitrary spin is discussed, as well as an approach to verifying our result.

HK 67.19 Th 14:00 Audi-Max

Study of the Measurement of Quarkonia in Different ALICE Central Barrel Detector Configurations — •Anna Bernhard for the ALICE-TRD-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt, Germany

The measurement of quarkonia is a very promising observable for the study of the quark gluon plasma. The central barrel detectors of ALICE (ITS, TPC, TRD) will reconstruct heavy $q\bar{q}$ pairs, both in heavy ion collisions and in p+p collisions as reference, via their decay into an electron-positron pair.

The TRD subdetector provides excellent electron identification. However, in the first periods of data taking at the LHC the TRD will not yet be completely installed. The expected performance for the measurement of quarkonia in $\sqrt{s}$ =14 TeV minimum bias p+p collisions via their decay into e^+e^- has been studied. Fast simulations have been performed, using the event generator PYTHIA and a parameterization of the detector response. We present the results for different scenarios: A fully installed TRD and various incomplete setups including the projected TRD configuration for the first run. Invariant mass spectra are shown for different p_T regions as well as the main sources for combinatorical and physical background. Expected yields for one year of data taking are given.

HK 67.20 Th 14:00 Audi-Max

Looking for phase transitions of strongly interacting matter applying new method on basic of Random Matrix Theory — •Mais Suleymanov[1] and Ehtiram Shahaliev[2] — [1]CIIT, Islamabad, Pakistan — [2]HEPL, JINR, Dubna, Russia

Over the last 25 years a lot of efforts have been made to search for new phases of strongly interacting matter. Heavy ion collisions are of great importance since they open a way to reproduce these phases in the Earth laboratory. But in this case the volume of information increases sharply as well as the background information.

The Ref. [1] introduced a method on the basic of Random Matrix Theory to study the fluctuations of neutron resonances in compound nuclei [1] **which doesn't depend on the background of measurements**. To analyze the energetic levels of compound nuclei the function of distances between two energetic levels $p(s_i)$ is defined as the general distributions for probability of all kinds of ensembles. At values of the index of universality $\nu = 0$ it will change to Poisson type distributions pointing to absence of any correlations in the system and at the values of $\nu = 1$ it will change to Wigner type behavior directing to some correlation in the studying ensemble.

We discuss that the experimental study of the behavior of $p(s_i)$ distribution for secondary particles could give a signal on the phase transitions.

References

1. C. E. Porter, Statistical Theories of Spectra: Fluctuations (Academic, New York, 1965)

HK 67.21 Th 14:00 Audi-Max

On the stability of fragments formed in heavy ion collision using microscopic binding algorithm — •supriya goyal and rajeev k. puri — physics department, panjab university, chandigarh-1600 14, india

The multi fragmentation phenomenon in heavy ion collisions has attracted a lot of attention in recent years. The last gem has also been linked with the liquid gas phase transition. This may also be used to pin down the nuclear equation of state. The phase space obtained with event generators has to be clusterized and often one also needs after burners to de-excite the fragments. One of the most popular clusterization algorithm is based on the spatial distance between nucleons. The serious problem with such simple algorithm is that we donot have control over the stability of the fragments, thus created. We here extend this algorithm to include the microscopic binding energy for each fragments using modified mass formula. We check the binding energy of each such fragment whether it is neutron rich/deficient at microscopic level and all fragments who fail to fulfill the check are treated as free nucleons. Our preliminary results show that 1. This new algorithm (named as Minimum Spanning Tree- Micro bound) enables us to filter all unstable fragments. 2. For the central reactions of Au-Au, the results are closer to experimental data indicating the need of microscopic binding energy for fragmentation.

HK 67.22 Th 14:00 Audi-Max

Trigger Particle Correlations in the First Collisions at ALICE — •Jason Glyndwr Ulery for the ALICE-TRD-Collaboration — Institut für Kernphysik, Frankfurt

Trigger particle correlations can provide interesting insights into jet physics. These correlations can be used in pp collisions to study jet fragmentation which is not calculable in pQCD. The angular and transverse momentum, p_T, distributions of the associated particles are of particular interest in this study. Trigger particle correlations in pp collisions can also be used as a reference for heavy-ion collisions. In previous experiments, these correlations have shown medium modification in heavy-ion collisions relative to pp collisions. In ALICE trigger particle correlations can be done at much higher p_T then has been done at SPS and RHIC due to the greatly increased cross section for high

energy jets at the LHC. Results will be shown for simulated pp collisions at LHC energies from the PYTHIA event generator. These events have been passed though a geometrical model for the ALICE detector and reconstructed by the ALICE reconstruction software. It can be demonstrated that trigger particle correlations can be performed with triggers of $p_T \approx 10$ GeV/c with one day of data taking.

HK 67.23 Th 14:00 Audi-Max

Decay Rate and Photodetachment Cross Section Measurement of the Negative Positronium Ion† — •Stefan Gärtner[1], Hubert Ceeh[2], Frank Fleischer[3], Christoph Hugenschmidt[2], Klaus Schreckenbach[2], Dirk Schwalm[4], and Peter Thirolf[1] — [1]Ludwig-Maximilians-Universität München, Garching, Germany — [2]Technische Universität München and FRM II, Garching, Germany — [3]University of Washington, Seattle, USA — [4]Max-Planck-Institut für Kernphysik, Heidelberg, Germany

The preparations of a new decay rate measurement of the Ps^- ion ($e^+e^-e^-$) at the NEPOMUC high flux positron source ($\approx 10^9$ moderated positrons per second) at the FRM II reactor in Garching are shown. The setup, which was previously mounted in Heidelberg, utilizes ≈ 5 nm thin Diamond Like Carbon (DLC) foils for the Ps^- production as well as for stripping off the electrons, which takes place immediately after the acceleration across a variable length gap. The aim is to improve the most accurate decay rate measurement [1] of $\Gamma = 2.089(15)\,\mathrm{ns}^{-1}$ by a factor of 5–10, thus allowing to test QED [2] for this fundamental leptonic three-body system. In a further step the photodetachment cross section of Ps^- will be measured at the two energies provided by the fundamental and second harmonic mode of a high power Nd:YAG laser for the first time. A photodetachment rate of the order of $40\,\mathrm{s}^{-1}$ and $4 \cdot 10^4\,\mathrm{s}^{-1}$ for continuous and Q-switched laser light, respectively, is expected. [1] F. Fleischer *et al.*, Phys. Rev. Lett. **96**, 063401 (2006). [2] M. Puchalski *et al.*, Phys. Rev. Lett. **99**, 203401 (2007). †Supported by DFG under contract HA1101/13-1.

HK 67.24 Th 14:00 Audi-Max

Near-Threshold Pion Photproduction at MAX-lab — •Jason Brudvik — for the MAX-Tagg Collaboration MAX-lab, Lund University, Sweden

Near-threshold pion photoproduction is an elementary process involving an explicit rearrangement of the quarks in the nucleon. It is thus a direct probe of the quark structure of the nucleon. At energies below the Delta resonance, pion photoproduction also provides a stringent test of chiral symmetry as a result of accurate predictions from chiral effective field theory. Precision sub-Delta measurements of the angular distribution and the total cross section for pion photoproduction are thus of fundamental importance. Surprisingly, aside from the $\gamma p \to p\pi^0$ channel which has been thoroughly studied at MAMI-B and SAL, few data exist in this crucial near-threshold region. MAX-lab in Sweden is the one photonuclear facility worldwide whose energy range is perfectly tuned to such experiments. As such, a comprehensive program of near-threshold pion photoproduction experiments has recently been initiated. These experiments include measurements of the angular distribution for π^+ photoproduction in the p-wave energy region for both the proton and heavier targets and the total cross section for π^- photoproduction close to threshold using a deuterium target. In this poster, an overview of the pion photoproduction program at MAX-lab will be presented. This overview will include preliminary results from commissioning runs for the previously mentioned experiments together with a look at future plans.

HK 67.25 Th 14:00 Audi-Max

Investigation of the Deuteron Breakup on Protons in the Forward Angular Region — •Izabela Ciepal — for JU/USl/KVI and GEM Collaborations

The system composed of three nucleons (3N) is the simplest nontrivial environment in which various models of nucleon-nucleon (NN) interaction can be investigated. Experimental studies of the ^{1}H(d,pp)n breakup reaction in a large phase space region, performed at KVI at the deuteron beam energy of 130 MeV, showed that the Coulomb interaction introduces an important contribution to the reaction dynamics. In contrast to the elastic scattering process, particular configurations of the breakup reaction are characterized by small relative energies of the outgoing charged particles (pp pairs in this case), therefore revealing an enhanced sensitivity to the Coulomb repulsion. The largest effects are observed in the domain of the smallest studied polar angles.

In order to investigate this problem in more details, a dedicated experiment was performed at FZ Jülich for the same reaction and energy, with the use of the GeWall detector. In this experiment a region of small polar angles (4°-14°) has been explored, not attainable in any other laboratory and crucial to investigate action of the Coulomb force. The results obtained for selected kinematical configurations are compared with various theoretical predictions, in particular with properly averaged calculations including Coulomb force effect.

HK 67.26 Th 14:00 Audi-Max

Nucleon – nucleon scattering phase shifts and the realistic potentials — •Marius Kaminskas and Gintautas Kamuntavicius — Vytautas Magnus University, Vileikos st. 8, LT-44404, Kaunas, Lithuania

The recent realistic nucleon – nucleon (NN) potentials are defined as set of functions v_{p}(r), present in expression:

V(r,Ω)=*_{p}v_{p}(r)O_{p}(Ω),

where r is a radial variable and Ω marks the set of angular variables and spin – isospin degrees of freedom of two interacting nucleons. The sum over p in this equation is restricted because the set O_{p}(Ω) consists of no more than 14 charge–independent operators. The main idea of paper is based on expression of NN potential in terms of orthogonal projectors P_{j^{π}t}(Ω) to different two – nucleon channels j^{π}t:

V(r,Ω)=*_{j^{π}t}V^{j^{π}t}(r)P_{j^{π}t}(Ω).

The narrow set of operators O_{p}(Ω) causes the problems with necessary number of NN phase shifts description. As a result, this produces very short set of two – nucleon channels j^{π}t, for which the independent NN potentials V^{j^{π}t}(r) can be constructed. From another side, the microscopic description of atomic nuclei requires the NN potentials, defined for large enough set of two - nucleon channels j^{π}t. May be, namely this shortage of operators O_{p}(Ω) causes well – known problems with lightest nuclei description.

HK 67.27 Th 14:00 Audi-Max

Nucleon – nucleon scattering phase shifts and the realistic potentials — •Marius Kaminskas and Gintautas Kamuntavicius — Vytautas Magnus University, Vileikos st. 8, LT-44404, Kaunas, Lithuania

The recent realistic nucleon – nucleon (NN) potentials are defined as set of functions $v_p(r)$, present in expression:

$V(r,\Omega) = \sum_p v_p(r) O_p(\Omega)$

where r is a radial variable and Ω marks the set of angular variables and spin – isospin degrees of freedom of two interacting nucleons. The sum over p in this equation is restricted because the set $O_p(\Omega)$ consists of no more than 14 charge–independent operators. The main idea of paper is based on expression of NN potential in terms of orthogonal projectors $P_{j^\pi t}(\Omega)$ to different two – nucleon channels $j^\pi t$:

$V(r,\Omega) = \sum_{j^\pi t} V^{j^\pi t}(r) P_{j^\pi t}(\Omega)$

The narrow set of operators $O_p(\Omega)$ causes the problems with necessary number of NN phase shifts description. As a result, this produces very short set of two – nucleon channels $j^\pi t$, for which the independent NN potentials $V^{j^\pi t}(r)$ can be constructed. From another side, the microscopic description of atomic nuclei requires the NN potentials, defined for large enough set of two - nucleon channels $j^\pi t$. May be, namely this shortage of operators $O_p(\Omega)$ causes well – known problems with lightest nuclei description.

HK 67.28 Th 14:00 Audi-Max

Beam-Spin Asymmetry Measurements at CLAS — •Mher Aghasyan[1], Marco Mirazita[1], Patrizia Rossi[1], and Harut Avakian[2] — [1]LNF-INFN, Via E. Fermi 40, Frascati, Italy — [2]JLAB, 12000 Jefferson Ave, Newport News, VA, 23606, USA

The single-spin asymmetries (SSA) that have been reported recently in semi-inclusive DIS by HERMES, COMPASS and CLAS, have emerged as a powerful tool to access the orbital motion of partons.

SSAs could arise in the fragmentation of polarized quarks (Collins effect) and from the interference of wavefunctions with different orbital angular momentum (Sivers effect). The two mechanisms produce different kinematical dependences and their contributions could be separated in measurements of different beam and target single-spin asymmetries.

This contribution presents recent results from Jefferson Lab's CLAS detector on beam SSAs in single neutral pion electroproduction off an unpolarized hydrogen targets in the DIS regime. The measured kinematical dependences are compared with model predictions.

HK 67.29 Th 14:00 Audi-Max

Progress in Pseudo-Scalar Meson Photoproduction Experiments at MAMI-C in Mainz. — John R M Annand, David

J Hamilton, David Howdle, Ken Livingston, •Ian James Douglas MacGregor, Joe Mancell, Eilidh McNicoll, Jamie Robinson, and Günther Rosner — Department of Physics and Astronomy, University of Glasgow, Glasgow UK

Since its upgrade in 2007, the Glasgow-Mainz spectrometer has provided a state-of-the-art photon tagger for a series of photo-production experiments at electron beam energies from 200 to 1508 MeV. We report on the operational status of the tagging spectrometer, refitted with a new focal-plane detector to extend its rate capability and improve its timing resolution by a factor 2. This complements the Crystal Ball and TAPS calorimeters, which provide almost 4π detection of both neutral and charged particles. These systems have very high detection efficiency for multi-photon final states. Measurement of pseudo-scalar-meson photo production on the nucleon is a major component of the experimental programme. We have data on π^0, π^+,η, η', K^0, K^+ (single and multiple-meson) final states for ^{1}H and ^{2}H targets. The eventual goal is to make *complete* measurements of the helicity amplitudes, which require at least 8 observables chosen properly from unpolarised, single-spin and double-spin possibilities. The possibilities in Mainz will extend when polarised targets become available in 2009. In December 2008 the maximum MAMI-C energy was raised to 1557 MeV and data taken with an open trigger at tagged-photon energies from 80 to 1447 MeV. We show some first analyses of these tests.

HK 67.30 Th 14:00 Audi-Max

The AMADEUS experiment and the KLOE data analysis for K-He interactions — •Vazquez Doce Oton — LNF-INFN

The AMADEUS experiment [1] will perform the first complete experimental study of the case of the so-called deeply bound kaonic nuclear states. Such a study has deep consequences in a still open sector of the strangeness hadronic/nuclear physics: how the hadron masses and hadron interactions change in the nuclear medium with consequences on the structure of cold dense hadronic matter. AMADEUS will perform exclusive - full acceptance - measurements, all particles in the formation and decay processes of deeply bound nuclear clusters will be detected.

Preliminary results from the analysis of KLOE experiment data in the search for the kaonic clusters will be presented as well.

[1] AMADEUS Phase-1: Physics, Setup and Roll-in Proposal, LNF preprint, LNF-07/24(IR), November 2007

HK 67.31 Th 14:00 Audi-Max

extraction of the magnetic formfactor and structure function of the n from inclusive lepton scattering data — •Avraham Rinat and Morton Taragin — Weizmann Institute of Science, Rehovot, Israel

We consider the reduced magnetic form factor α_n of the n, extracted from QE inclusive lepton scattering, which requires the separation of the QE (NE) and inelastic parts (NI) of structure functions $F_2^A(x, Q^2)$ for the Bjorken variable $x \approx 1$.The latter dominates, except around the QEP. Previous JLab data [1] primarily on D showed $\alpha_n(Q^2)$ to decrease from 1to about 0.78 for $Q^2 \approx 1.5 - 10$ GeV^2 [2]. Analysis of recent inclusive data on various targets [3] appear to be incompatible with the oldJLab data and can not be used to extract α_n [4].

We therefore turned to data on F_2^D for fixed Q^2 [5]. Although scatter is apparent in the above data, we could assemble sufficient data points to determine suitable averages for $\alpha_n(Q^2)$. For the available range $Q^2 \lesssim 5.7$ GeV^2 we confirm the previously observed decrease of α_n.

An alternative source of information for α_n is the ratio of semi-inclusive cross sections $e(D,p)e, n/e(D,n)e, p$. A recent experiment shows a flat behaviour for $Q^2 \lesssim 3.2$ GeV^2, followed by data points with appreciable scatter out to $Q^2 = 5$ GeV^2 [6].

Inclusive scattering data also contain information on F_2^n. An extraction method, which has been applied before [7] for the data of Ref. (1), has also been used for those of Ref. (5). Determination of higher twist corrections in $F_2^{p,D}$ constitute alternative input for the construction of F_2^n [8].

HK 67.32 Th 14:00 Audi-Max

Superscaling predictions for quasielastic neutrino-nucleus scattering — •Cristina Martinez — Nuclear Physics Department, Complutense University of Madrid

The possibility of applying superscaling ideas to predict neutral-current (NC) quasielastic (QE) neutrino cross sections for beams of a few GeV is investigated. Results obtained within the relativistic impulse approximation (RIA) using the same relativistic mean field potential (RMF) for both initial and final nucleons — a model that has been capable of reproducing the experimental (e, e') scaling function — are used to illustrate the ideas involved. While NC reactions, where the final neutrino is not detected, are apparently not well suited for scaling analyses, to a large extent the predictions of the RIA-RMF model do exhibit superscaling. Independence of the scaled response on the nuclear species is very well fulfilled. The RIA-RMF NC superscaling function is in good agreement with the one obtained using (e, e') data. Guided by the results for the RIA-RMF, the idea that electroweak processes on nuclei can be described with a universal scaling function, provided that some mild restrictions on the kinematics of the NC reactions are assumed, is shown to be a good one.

HK 67.33 Th 14:00 Audi-Max

Isovector pairing effect on the particle-number projection two-proton separation energy — •Djamila Mokhtari[1], Slimane Kerrouchi[1], Mohamed Fellah[1,2], and Nassima-Hosni Allal[1,2] — [1]Laboratoire de physique théorique, Faculte de Physique, USTHB BP32, el Alia-16111, Bab ezzouar, ALgiers, Algeria — [2]Centre de Recherche Nucléaire d'Alger, Comena, 2Bd, Algiers, Algeria

The two-proton separation energy is studied by performing a particle-number projection with [1] and without [2] inclusion of the isovector neutron-proton (np) pairing correlations. It is numerically evaluated for even-even rare-earth nuclei such that the np pairing parameter is non-zero.

It is shown that the two-proton separation energy values calculated using the two approaches join, for almost all the considered elements, for the highest values of (N-Z).

However, the results including the np pairing correlations are closest to the experimental data when available.

Moreover, the two methods lead to the same prediction of the two-proton drip-line position, except for the Dysprosium and the Tungsten.

[1]N.H. Allal, M. Fellah, M.R. Oudih and N. Benhamouda, Eur. Phys. J. A27, s01(2006)301. [2]M.Fellah, T.F. Hammann and D.E. Medjadi, Phys. Rev. C8(1973)1585.

HK 67.34 Th 14:00 Audi-Max

Continuum Random Phase Approximation based on Point Coupling RMF Lagrangian. — •Ioannis Daoutidis and Peter Ring — Physik-Department der Technischen Universität München, D-85748 Garching, Germany

Relativistic Continuum Random Phase Approximation (CRPA) is used to investigate collective excitation phenomena in several spherical nuclei along the periodic table. For the ground state, we perform point Coupling RMF calculations with the parameter set PC-F1. Using a residual interaction, derived from the same RMF approach, we solve the RPA equations in order to produce the isoscalar monopole, isovector dipole and isoscalar quadrupole resonances. Finally, we compare their properties, such as centroid energies and strengths, with those of the well studied discrete RPA approaches. Experimental data are also given for comparison.

HK 67.35 Th 14:00 Audi-Max

Influence of the isovector pairing effect on the nuclear statistical quantities — •Mohamed Belabbas[1], Ismahane Ami[2,3], Naziha Benhamouda[3], Mohamed Fellah[3,4], and Nassima-Hosni Allal[3,4] — [1]Faculté des Sciences et des Sciences de l Ingénieur, Université Hassiba Ben Bouali, BP151, 02000 Chlef, Algeria — [2]Institut des Sciences et de la Technologie, Université Yahia Fares de Médéa, Aïn-D heb, 26000 Médéa, Algeria — [3]Laboratoire de Physique Théorique, Faculté de Physique, USTHB, BP32, El-Alia, 16111 Bab-Ezzouar, Alger, Algeria — [4]Centre de Recherche Nucléaire d Alger, COMENA, BP 399 Alger-Gare, Alger, Algeria

Temperature-dependent isovector pairing gap equations have been recently established using a path integral approach [1]. In the present work, the expressions of the main usual statistical properties, that is, the energy, the entropy and the heat capacity are established within the same model. These expressions generalize the Finite Temperature BCS (FTBCS) ones for the pairing between like-particles. Numerical calculations are carried out within the one-level model. The obtained results are compared to those of the usual FTBCS approach for the pairing between like-particles.

[1] M. Fellah, N.H. Allal, M. Belabbas, M.R. Oudih and N. Benhamouda, Phys. Rev. C76, 047306(2007).

HK 67.36 Th 14:00 Audi-Max

Photoresponse of ^{94}Mo at energies up to 8.6 MeV* — •Christopher Romig[1], M. Fritzsche[1], K. Lindenberg[1], N. Pietralla[1], G. Rusev[3], D. Savran[1], K. Sonnabend[1], A. P. Tonchev[3], W. Tornow[3], H. R. Weller[3], and A. Zilges[2] — [1]Institut für Kernphysik, Technische Universität Darmstadt, Germany — [2]Institut für Kernphysik, Universität zu Köln, Germany — [3]Triangle Universities Nuclear Laboratory, Duke University, Durham, NC, USA

The isotope ^{94}Mo was investigated in nuclear resonance fluorescence [1] experiments at the High Intensity Photon Setup (HIPS) at the S-DALINAC in Darmstadt using bremsstrahlung photons with energies of 7.65 and 8.6 MeV, respectively, and at the High Intensity γ-ray Source (HIγS) at Duke University using photons from Laser Compton backscattering. Thereby over 60 excitations were found which could be assigned to ^{94}Mo due to the highly enriched sample. In the energy region between 5.4 and 8 MeV many transitions could be classified as dipole transitions and cross sections, angular momentum quantum numbers, half-lifes and transition strengths were determined. At HIγS the parity quantum numbers of 40 exitations between 5.5 and 7.0 MeV could be determined.
The methods and results will be presented.
* Supported by DFG (SFB 634)
[1] U. Kneissl, N. Pietralla, A. Zilges, J. Phys. G: Nucl. Part. Phys. **32** (2006) R217

HK 67.37 Th 14:00 Audi-Max

The two-fermions – four-bosons nucleus ^{198}Hg within the extended supersymmetry description — •Christian Bernards, Christoph Fransen, Stefan Heinze, Jan Jolie, and Désirée Radeck — Institute for Nuclear Physics, University of Cologne

Low-energy excitations of heavy even-even nuclei can be described well using the Interacting Boson Model (IBM) [1]. The supersymmetric extension of the IBM uses a symmetry between fermions and bosons and has already been successfully applied to describe low-energy excitations in the Au-Pt mass region.

Using the Interacting Boson Fermion Fermion Model (IBFFM) predictions for ^{198}Hg have been derived in [2], considering two $j = 3/2$ proton fermions and four neutron bosons with respect to the ^{208}Pb shell closure. Referring to [3], this IBFFM configuration should describe excited two-quasiparticle and not low-lying ^{198}Hg states. We show that an equivalent description for ^{198}Hg can be achieved within the IBM-2 and that new experimental data shows quite a good matching to the theoretical predictions – also for the low-energy states.

[1] F. Iachello and A. Arima. *The Interacting Boson Model*. Cambridge University Press, 1987.
[2] J. Jolie. *The Interacting Boson-Fermion Model: Bose-Fermi Symmetries and Supersymmetries*. PhD thesis, University of Gent, 1986.
[3] F. Iachello and P. Van Isacker *The Interacting Boson Fermion Model*. Cambridge University Press, 1991.

HK 67.38 Th 14:00 Audi-Max

Fission Half-Lifes of Superheavy Elements in a Microscopic-Collective Model — •Jochen Erler, Nils Schindzielorz, and Paul-Gerhard Reinhard — Institut für Theoretische Physik II, Universität Erlangen-Nürnberg

Spontaneous fission is one of the dominant decay modes of superheavy elements (SHE). We present a large scale survey of barrier heights and life-times for spontaneous fission in the regime of SHE, i.e. nuclei with Z=104-122. This is done on the basis of the Skyrme-Hartree-Fock model which yields the input for a microscopic description, the Generator Coordinate Method (GCM), of the collective phenomenon fission. The actual tunneling probability is estimated by the WKB approximation. To calculate the necessary ingredients namely the collective masses and the corrected potential energy surface self-consistent cranking is used. To explore the possible sensitivity of the fission life-times to the parameterization of the Skyrme force, sufficiently different parameterizations are considered.

These fission life-times are compared with the life-times τ_α of the α-decay which is a competing decay channel for many SHE. The τ_α are calculated from the Q_α reaction energies using an estimate based on the Viola systematics. Finally, we compare with the β-decay rates of the SHE.

HK 67.39 Th 14:00 Audi-Max

Constraint Skyrme-Hartree-Fock calculations in 3D — •Nikolaus Löbl[1], Joachim Maruhn[1], and Paul-Gerhard Reinhard[2] — [1]Goethe Universität, Frankfurt — [2]Friedrich-Alexander-Universität, Erlangen-Nürnberg

We implemented several multipole constraints into a full 3D Skyrme-Hartree-Fock (SHF) code. The used algorithm was already successfully tested in axial SHF and relativistic mean-field(RMF)approaches. In a first step we added the constraints linearly to the energy functional, i.e. $\lambda < \hat{Q} >$. The second step was to connect the added quantity to meaningful physical observables. Of course the $< \hat{Q} >$ should be the expectation value of a multipole operator, therefore the Lagrange-multiplier λ had to be adapted by iteration. It was a challenging task to reach suitable convergence in 3D. After a period of parameter optimization we were able to obtain deformation energy curves with a constraint on the Q_{20} mass quadrupole moment. With an additional Q_{22} constraint it was also possible to prepare triaxial states. Applications to be presented: cluster configurations in ^{16}C and fission barriers in the actinide region.

HK 67.40 Th 14:00 Audi-Max

Optimization of the recoil-shadow projection method for the investigation of short-lived fission isomers* — •M. Helmecke, P.G. Thirolf, D. Habs, E. Gartzke, V. Kolhinen, C. Lang, J. Szerypo, and L. Trepl — Fakultät f. Physik, LMU München, Germany and Maier-Leibnitz Laboratory, Garching, Germany

Spectroscopic studies of super- and hyperdeformed actinide nuclei offer the possibility to gain insight into the multiple-humped fission barrier landscape. With the identification of deep third minima in ^{234}U and ^{236}U the systematics of fission isomers in light actinides was revisited, especially searching for isomers in light uranium isotopes with half-lives in the pico-second range. Using the recoil-shadow projection method [1] and solid state nuclear track detectors, an experimental search for their observation has been started. This well-established detection technique nowadays benefits from an efficient analysis technology based on a PC-controlled auto-focus microscope and a CCD camera together with pattern recognition software. The flatness and the definition of the shadow edge of the target is the critical point of this method: Due to the energy loss of the beam the target carrier foil (1μm Ni) may develop thermal distortions in the μm range, leading to misinterpretations of isomeric fission fragments. Therefore the flatness of the target foil is continuously monitored via a capacitance measurement. First results applying this method to the search of a fission isomer in ^{234}U via the ^{232}Th(α,2n) reaction will be presented.
[1] Metag et al., Nucl. Instr. Meth. 114 (1974) 445.
*supported by DFG Cluster of Excellence UNIVERSE

HK 67.41 Th 14:00 Audi-Max

Collective dipole response of proton-rich nuclei ^{32}Ar and ^{34}Ar. — •Olga Lepyoshkina[1] and Christoph Langer[2] for the LAND-S327-Collaboration — [1]Physik Department TU München, Garching — [2]Institut für Kernphysik, Universität Frankfurt, Frankfurt am Main, Germany

The earlier observation of low-lying dipole strength in neutron rich nuclei and its interpretation with respect to basic nuclear properties (symmetry energy, skin thickness) initiated the investigation of this phenomenon in proton-rich nuclei. Macroscopically this strength could be explained with the resonant dipole oscillation of a proton skin against the isospin-symmetric core. For nuclei like ^{32}Ar the occurrence of pronounced dipole strength is predicted in the low-energy region between 8-10 MeV excitation energy. For the ^{34}Ar the pygmy strength is expected to drop sharply and vanish entirely for the N=Z nucleus ^{36}Ar.

The experiment S327 has been performed in August 2008 at the GSI Darmstadt in Cave C using the LAND reaction setup. Fragmentation of a 800 A MeV primary ^{36}Ar beam on a Be target was used to produce the radioactive isotopes ^{34}Ar and ^{32}Ar. After passing the FRS (Fragment Separator) the ions impinged on a Pb target. The dipole response is observed using the Coulomb excitation method in inverse kinematics. The concept and the experimental method will be shown in the context of the underlying physics case in ^{32,34}Ar.

This work was supported by GSI F&E and BMBF.

HK 67.42 Th 14:00 Audi-Max

Towards optical access to the lowest nuclear transition in ^{229m}Th† — •P.G. Thirolf[1], M. Bussmann[1,3], D. Habs[1], J. Neumayr[1], T. Schaetz[2], H. Schmitz[1,2], J. Schreiber[1,4], J. Szerypo[1], L. Trepl[1], and H.-F. Wirth[1] — [1]LMU München, Garching, Germany — [2]MPI für Quantenoptik, Garching, Germany — [3]FZ

Dresden, Dresden, Germany — [4]Imperial College, London, UK

^{229m}Th exhibits the lowest-lying nuclear excitation with an excitation energy of only 7.6(5) eV (163(11) nm) and an isomeric lifetime of $\sim 10^4$ s, giving rise to an extremely sharp relative line width of the ground state transition of $\sim 10^{-20}$. This transition qualifies as an extremely sharp frequency standard, allowing to build a nuclear clock with unprecedented accuracy. Moreover, theoretical calculations predict an enhancement of the sensitivity to time dependent variations of fundamental constants like the fine structure constant α by about 10^6. Laser excitation of the 7.6 eV transition requires a precise knowledge of the transition energy. Therefore the ^{229m}Th isomers are populated via α decay from ^{233}U in a buffer gas cell, from where they are selectively extracted and collected. The UV fluorescence photons are then collimated via a MgF_2 lens and sharp filters onto an MCP detector and secondary electrons are registered on a phosphorous screen by a CCD camera. In order to prepare for subsequent sympathetic laser cooling in a $^{24}Mg^+$ Coulomb crystal, a laser setup consisting of an Yb fibre laser and a frequency quadrupling stage is presently under construction.

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

HK 67.43 Th 14:00 Audi-Max

Measurement of the $g(2_1^+)$-factor in ^{140}Ba with the "Recoil-in-Vacuum"method — •Christopher Bauer, Norbert Pietralla, and Jörg Leske — Institut für Kernphysik, Technische Universität Darmstadt, 64289 Darmstadt, Germany

The "Recoil-in-Vacuum"method as described recently in [1][2] is used to determine the unknown magnetic moment of the 2_1^+ state in the neutron-rich nucleus ^{140}Ba. A Coulomb excitation experiment in inverse kinematics was performed at REX-Isolde (CERN) in 2007. Beams of ^{140,142}Ba were impinging on a 0.9mg/cm^2 ^{96}Mo target and a 1 mm Cu stopper. Gamma rays were detected by the MINIBALL array, a DSSSD was used for particle identification.

The microscopic structure of the 2_1^+ state is investigated by the magnetic moment, which is sensitive to the composition of the wave function regarding proton and neutron configurations, and is compared to predictions from various calculations.

[1] N. J. Stone et al., Phys. Rev. Lett. **94**, 192501 (2005)
[2] A. E. Stuchberry and N. J. Stone, Phys. Rev. C **76**, 034307 (2007)

HK 67.44 Th 14:00 Audi-Max

Octupole vibrations in rare-earth nuclei — •Marc André Büssing, Michael Elvers, Janis Endres, Jens Hasper, and Andreas Zilges — Institut für Kernphysik, Universität zu Köln, D-50823 Köln

The systematics of octupole vibrations in the region of rare-earth nuclei are still not well understood.

First test measurements have been carried out at the FN Tandem accelerator of the University of Cologne. The gamma-ray spectroscopy was performed at the highly-efficient HORUS spectrometer which consists of 16 High-Purity Germanium detectors. The nucleus ^{158}Dy has been investigated via the reactions ^{156}Gd(α,2n) and ^{149}Sm(^{12}C,3n), furthermore the nucleus ^{154}Dy was studied via the reaction ^{144}Nd(^{14}N,4n). In addition measurements with the (p,p$'$) reaction were carried out on the nuclei ^{142}Nd and ^{172}Yb.

First results of these measurements are shown in the context of existing data for this mass region.

HK 67.45 Th 14:00 Audi-Max

Nuclear moments and hyperfine structure parameters for heavy isotopes within QED and relativistic mean field theory — •Olga Khetselius — Odessa University, P.O.Box 24a, Odessa-9, Ukraine, 65009

Consistent calculation of the nuclear electric quadrupole moments Q and hyperfine structure parameters for heavy elements is carried out within the gauge-invariant QED [1]perturbation theory and relativistic mean field approach [2]. The results of calculating the nuclear moments and hfs constants are presented for 201Hg, 207Pb, 223Ra. For element 201Hg we have received Q= 380,5 mbarn. It is agreed the best of all with experimental value, received by group Ulm etal (general interval of the experimental values is 300-600 mb). For element of 223Ra our value is Q=1,22 barn. It is in the limits of last experimental measurements values by Wendt group (ISOLDE Collaboration). The role of the nuclear effects contribution (core-polarization ones, which are induced by valent protons of a nucleus), temporal distribution of magnetization in a nucleus (effect of Bohr-Weisskopf) and non-accounted high order QED corrections is analyzed.

References [1] A. Glushkov, O.Khetselius, et al, Nucl.Phys.A. 734S, 21 (2004); J.Phys.CS. 35 430 (2006); Recent Adv. In Theory of Phys. and Chem Systems (Springer). 15, 285 (2006); Europ.Phys.Journ.ST. 160,195 (2008); Proc.MENU-08, SLAC (2008). [2] T.Nagasawa, A.Haga, M.Nakano, Phys.Rev.C.69,0934322 (2004).

HK 67.46 Th 14:00 Audi-Max

Relativistic calculation of the beta decay probabilities in the optimized Dirac-Kohn-Sham atom model and a chemical environment effect — •Alexander Glushkov[1,2], Olga Khetselius[1], Yuliya Dubrovskaya[1], and Ludmila Lovett[3] — [1]Odessa University, P.O.Box 24a, Odessa-9, 65009, ukraine — [2]Russian Academy of Sciences, Troitsk, Moscow reg., 142090, Russia — [3]UK National Academy of Sciences and Bookdata Co., London SW1Y 5AG, UK

New theoretical scheme for calculating the beta decay characteristics and an account for chemical environment effect on the beta decay ones is developed. As method of calculation of the relativistic fields and electron wave functions, the gauge invariant Dirac-Fock and Dirac-Kohn-Sham approaches are used [1,2]. The results of calculating the decay probabilities for the beta decays: 33P-33S, 35S-35Cl, 63Ni-63Cu, 241Pu-241Am are presented. Comparison of the Fermi function values is carried out for different approximations of an exchange effect account, calculation with using wave functions on the boundary of the charged spherical nucleus and with using squires of the amplitudes of expansion of these functions near zero. References. A.V.Glushkov etal, In: New Projects and New lines of research in Nuclear Physics, eds.Fazio G., Hanappe F. (World Sci.. Singapore,2003); Nucl.Phys.A. 734S,21 (2004). 2. A.V.Glushkov et al, Int. Journ. Quant.Chem. 99, 936 (2004); 104, 512 (2005); J.Phys.CS.35,425 (2005); Recent Adv. in Theory of Phys.and Chem.Syst.(Springer) 15, 285 (2006); In: Low Energy Antiproton Phys.(AIP)796, 206,211(2005).

HK 67.47 Th 14:00 Audi-Max

TRIGA-Laser: Collinear laser spectroscopy on short-lived fission products and heavy elements at the research reactor TRIGA Mainz — •Jörg Krämer[1], Klaus Blaum[2], Klaus Eberhardt[1], Christopher Geppert[3], Andreas Krieger[1], and Wilfried Nörtershäuser[1,3] — [1]Mainz, Institut für Kernchemie, Mainz, Germany — [2]Max-Planck-Institut für Kernphysik, Heidelberg, Germany — [3]Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

At the TRIGA research reactor at the University of Mainz a collinear laser spectroscopy experiment is currently being installed, which serves as a prototype for the LaSpec collaboration within FAIR at GSI Darmstadt. This setup at the TRIGA reactor allows to study short-lived fission products created near the reactor core by neutron induced fission. A variety of fissionable actinide isotopes are available as target materials up to ^{249}Cf which give access to different regions of the nuclear chart. A special gas-jet transport system will be used to guide the nuclei towards an ion source, where ion beams of a large variety of elements up to refractory elements will be produced and after mass separation be guided either to the collinear beamline of TRIGALASER for laser spectroscopic studies or to TRIGATRAP for high-accuracy mass measurements. In the first phase of the experiment a purely optical detection system with photomultipliers is planned. We will present the technical outline of the experiment, the results of ion optics performance tests making use of a surface ion source and give a status report of laser spectroscopy test measurements with Rb atoms.

HK 67.48 Th 14:00 Audi-Max

Two-phonon γ-vibrational states in ^{170}Er — •Douglas DiJulio, Joakim Cederkall, Claes Fahlander, Pavel Golubev, Dirk Rudolph, Andreas Ekström, Emma Johansson, and Edana Merchan — Physics Department, Lund University, Sweden

Two phonon γ-vibrational states in the nucleus ^{170}Er have been investigated by Coulomb excitation. The experiments were carried out at the Laboratori Nazionali di Legnaro (LNL) using the GASP array coupled to the new Lund Silicon Array (LuSiA) detector system for charged particle detection. LuSiA consists of four square double-sided silicon-strip detectors mounted in a box surrounding the target position. The two-phonon γ-vibrational states were populated using the ^{32}S +^{170}Er reaction at a "safe"beam energy of 117 MeV. Along with the excitation energies of the states, of particular interest is the B(E2) ratio between the transitions from the two-phonon and one-phonon states which is predicted to have a specific value at the critical point Y(5). Preliminary results from the experiment will be presented.

HK 67.49 Th 14:00 Audi-Max

Characterization of Detector Systems for Photofission Studies† — •P.G. Thirolf[1], M. Csatlos[2], L. Csige[2], M. Fujiwara[3], J. Gulyas[2], D. Habs[1], A. Krasznahorkay[2], N. Pietralla[4], D. Savran[4], and T. Tajima[1] — [1]LMU München, Garching, Germany — [2]Inst. Nucl. Res. of the Hungarian Acad. of Sciences, Debrecen, Hungary — [3]Res. Center f. Nucl. Phys., Osaka University, Japan — [4]IKP, TU Darmstadt, Germany

A brilliant source of photon beams in the X-ray - MeV range can be realized by (coherent) Compton backscattering of laser photons off a dense relativistic electron mirror generated from thin (few nm) diamond-like carbon foils [1]. Highly monochromatic photon beams can be expected with unprecedented photon flux intensities of up to 10^{12} photons/pulse at 8 MeV photon energy, operated at a laser repetition rate of 10 Hz. Such photon beams will offer new perspectives for photon-induced nuclear structure studies, e.g. in the second and third minima of actinides. Preparing for photofission studies in actinides, Parallel Plate Avalanche gas detector (PPAC) arrays have been commissioned, each equipped with a stack of 15-25 large area fissile actinide targets (^{235,238}U, ^{232}Th), where the actinide targets simultaneously act as detector electrodes. Properties of the detector systems will be presented, which will be included in first experiments at the Darmstadt NEPTUN tagger facility or the NEW SUBARU facility in Osaka.

[1] D. Habs et al., Appl. Phys. B93 (2008) 349.

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

HK 67.50 Th 14:00 Audi-Max

Evidence for an isomeric $3/2^-$ state in ^{53}Co — Dirk Rudolph[1] and •Robert Hoischen[1,2] for the RISING S244-Collaboration — [1]Department of Physics, Lund University, S-22100 Lund, Sweden — [2]Helmholtzzentrum für Schwerionenforschung GmbH, D-64291 Darmstadt, Germany

The fragmentation of a 550 MeV/u primary beam of ^{58}Ni on a ^{9}Be target has been used to measure time- and energy-correlated γ decays following the implantation of event-by-event discriminated secondary fragments into a ^{9}Be stopper plate. A new isomeric γ decay with $T_{1/2} = 14(^{6}_{4})$ ns and $E_\gamma = 646.2(2)$ keV is observed and attributed to the decay of the yrast $3/2^-$ state in $^{53}_{27}$Co$_{26}$. This short-lived isomeric state has been populated by means of nuclear reactions during the stopping process of the secondary fragments. The experimental findings are discussed in the framework of large-scale spherical shell-model calculations in conjunction with isospin symmetry breaking residual interactions for the $A = 53$, $T_z = \pm 1/2$ mirror nuclei ^{53}Co and ^{53}Fe.

HK 67.51 Th 14:00 Audi-Max

Experimental Setup for Conversion Electron Spectroscopy of Shape Isomers in ^{239}Pu† — •P.G. Thirolf[1], D. Habs[1], C. Lang[1], T. Morgan[1], W.C. Parker[2], and W. Schwerdtfeger[1] — [1]LMU München, Garching, Germany — [2]Univ. of Arizona, Tuscon, USA

Investigating shape isomers in odd-A actinide nuclei probes the nuclear single-particle structure of heavy nuclei at large deformations, thus allowing to refine nuclear models. Besides γ-spectroscopic studies, conversion electron spectroscopy is an indispensable tool to complement the experimental spectroscopic information. Fission isomers in ^{239}Pu were populated via the ^{238}U(α, 3n) reaction (E_α = 33 MeV) at the Garching Tandem accelerator. A recoil shadow technique was used to selectively detect only fission fragments from shape isomeric decays at backward angles. For the detection of conversion electrons three Mini-Orange spectrometers (i.e. magnetic transport and filter systems with a toroidal magnetic field from permanent magnet wedges in conjuction with lN_2-cooled Si(Li) detectors) were used at forward angles. Due to the long lifetime of 8 μs of the fission isomer in ^{239}Pu an annular catcher foil was placed behind the target to stop the recoiling isomers prior to their isomeric fission decay. In order to optimize the solid angle coverage for delayed fission fragment detection, a large array of silicon solar cells (15 modules, each 4x2 cm^2) was used at backward angles. Delayed fission fragments were detected in coincidence with electrons detected in the Si(Li) detectors of the Mini-Orange spectrometers.

†Supported by the DFG Cluster of Excellence UNIVERSE and by DAAD via the RISE program.

HK 67.52 Th 14:00 Audi-Max

Measurements for astrophysical calculations at ISOLTRAP — •Martin Breitenfeldt — Ernst-Moritz-Arndt-Universität, Greifswald, Germany

With ISOLTRAP at ISOLDE/CERN mass measurements on exotic nuclides are performed down to a precision of $\delta m/m = 8 \cdot 10^{-9}$. The mass as a fundamental ground state property finds applications in many theoretical calculations, especially in nuclear physics and astrophysics. In the last years part of the measurements at ISOLTRAP focussed on nuclides relevant for nucleosynthesis studies. Several measurement campaigns in 2005-2008 were dedicated to the mass determination of neutron rich nuclides close to the proton shell $Z = 50$ and the pathway of the r-process. The masses of $^{112,114,116-121,123}$Ag and ^{114,120,124,126,128}Cd were determined. In addition to the neutron-rich isotopes, the masses of the neutron-deficient nuclides $^{99-109}$Cd have been determined. The mass of ^{99}Cd has been measured directly for the first time, giving a mass value close to the doubly magic ^{100}Sn and the end-point region of the rp-process. An overview of the results and their impact on the astrophysical calculations will be presented.

HK 67.53 Th 14:00 Audi-Max

Temperature-dependent nuclear moment of inertia including neutron-proton pairing correlations — •Ismahane Ami[1,2], Mohamed Belabbas[3], Naziha Benhamouda[2], Mohamed Fellah[2,4], and Nassima-Hosni Allal[2,4] — [1]Institut des Sciences et de la Technologie, Université Yahia Fares de Médéa, Aïn-D heb, 26000 Médéa, Algeria — [2]Laboratoire de Physique Théorique, Faculté de Physique, USTHB, BP32, El-Alia, 16111 Bab-Ezzouar, Alger, Algeria — [3]Faculté des Sciences et des Sciences de l Ingénieur, Université Hassiba Ben Bouali, BP151, 02000 Chlef, Algeria — [4]Centre de Recherche Nucléaire d Alger, COMENA, BP 399 Alger-Gare, Alger, Algeria

Expressions of the temperature-dependent parallel and perpendicular nuclear moments of inertia including neutron-proton pairing correlations have been established. The latter have been derived using the cranking method as well as the isovector temperature-dependent gap equations [1]. They generalize the expressions of the usual finite-temperature BCS (FTBCS) method. The model has been applied to the schematic Richardson model. The obtained results are compared to those of the usual FTBCS approach for the pairing between like-particles.

[1] M. Fellah, N.H. Allal, M. Belabbas, M.R. Oudih and N. Benhamouda, Phys. Rev. C76, 047306(2007).

HK 67.54 Th 14:00 Audi-Max

Lifetime measurements of intermediate spin states in ^{133}Sb by fast-timing technique — •Dan Gabriel Ghita[1], Henryk Mach[2,3], Ulli Koester[4], and Gary Simpson[4] — [1]Horia Hulubei National Institute for Physics and Nuclear Engineering, Magurele, Ilfov 077125, Romania — [2]Institute for Structure and Nuclear Astrophysics, University of Notre Dame, Notre Dame, Indiana 46616, USA — [3]Department of Nuclear and Particle Physics, Uppsala University, P. O. Box 535, S-75121 Uppsala, Sweden — [4]Institut Laue Langevin, Grenoble, France

Recent developments of the fast-timing setup at Lohengrin ILL Grenoble, by using high performance $LaBr_3$(Ce) scintillators and a new ionisation chamber, significantly improved the precision of lifetime measurements. In the present work we investigate the ^{133}Sb nucleus, by employing the new experimental setup. The ^{133}Sb nucleus has just one proton outside the doubly magic ^{132}Sn and it is an excellent test ground for the nuclear shell model. A 17 microsecond isomer was previously observed in this nucleus. Measurements of the lifetimes of the states below this isomer allows not only to verify the multipolarity of the transitions, but also to establish the level scheme. Furthermore, the lifetimes extracted from our experiment allows to test various shell model calculations which should be able to accurately predict lifetimes of the states for this simple nucleus.

HK 67.55 Th 14:00 Audi-Max

Nuclear structure research with thePenningtrap mass spectrometer ISOLTRAP at CERN — •Dennis Neidherr for the ISOLTRAP-Collaboration — Johannes Gutenberg-Universität Mainz, Germany

At the double-Penning-trap mass spectrometer ISOLTRAP [1] at ISOLDE/CERN the cyclotron frequency of short-lived radionuclides is measured in order to determine their mass with a relative uncertainty in the order of 10^{-8} and below. This ground state property plays an important role in many fields of modern physics from nuclear-structure research to nuclear astrophysics and tests of the weak interaction of the Standard Model. An example for the first one is the evolution of the nuclear shape as a function of the number of neutrons and protons. In 2008 the masses of $^{223-229}$Rn and $^{143-146}$Xe were measured for the first time directly, whereas ^{229}Rn was even discovered by our

Penning trap based experiment. With this mass values one can study the proton-neutron interaction and therefore get information about the nuclear structure like collectivity, the onset of deformation or the geometrical shapes in atomic nuclei [2]. The experimental results as well as the impact on the theoretical models will be presented.

[1] M. Mukherjee *et al.*, Eur. Phys. J. A 35, 1-29 (2008).
[2] R.B. Cakirli *et al.*, Phys. Rev. Lett. 94, 092501 (2005).

HK 67.56 Th 14:00 Audi-Max

Quarks confinement and the nucleon-nucleon interaction — •Agne Masalaite[1], Gintautas Kamuntavicius[1], Mindaugas Lekaveckas[2], and Saulius Mickevicius[1] — [1]Department of Physics, Faculty of Natural Sciences, Vytautas Magnus University, Vileikos 8, Kaunas LT-44404, Lithuania — [2]Faculty of Science, P.O. Box 44 (Jyrängöntie 2), FI-00014 University of Helsinki, Finland

Recently many studies have been devoted for understanding the nucleon-nucleon interaction and the atomic nuclei structure starting from quark models. The way for this problem solution selected by us is based on a nontraditional consideration of the confinement of valence quarks in cases when two, three or more nucleons approach each other and the corresponding confinement potentials come into contact and vanish. The overlap of wave-functions of valence quarks, trapped in different nucleons, causes correlations thus giving the possibility to understand the peculiarities of the nucleon-nucleon interaction and corresponding potential modifications in case, when interacting nucleons are present in atomic nucleus. The investigated systems of double-, triple- and larger number of confining harmonic oscillator wells opens new possibilities for recent realistic nucleon-nucleon potentials modifications taking into account the substructure of interacting nucleons. Nucleons entering the interaction area change due to the intrinsic structure modification. These changes are dependent on the presence of "spectator" nucleons in vicinity of interacting ones. This observation can serve as alternative of three nucleon potential necessary for lightest nuclei description.

HK 67.57 Th 14:00 Audi-Max

Coulomb Excitation of ^{148}Sm — •Thomas Möller[1], Tan Ahn[2], Michael Carpenter[3], Laurent Coquard[1], Robert Janssens[3], Jörg Leske[1], Norbert Pietralla[1], and Georgi Rainovski[4] — [1]Institut für Kernphysik, TU Darmstadt — [2]WNSL, Yale University, New Haven, CT, USA — [3]Argonne National Laboratory, Argonne, IL, USA — [4]Faculty of Physics, St. Kliment Ohridski University Sofia, Bulgaria

The isovector one-phonon quadrupole excitation of the valence shell, the $2^+_{1,\mathrm{ms}}$ mixed-symmetry state, is a fundamental excitation mode of vibrational-type nuclei [1]. In order to investigate the evolution of the $2^+_{1,\mathrm{ms}}$ state in the chain of Sm isotopes, Coulomb-excitation experiments in inverse kinematics on ^{148}Sm and ^{154}Sm have been performed at Argonne National Laboratory. Beams of these isotopes were accelerated by the ATLAS accelerator and shot onto a ^{12}C target with energies of 550 MeV and 570 MeV, respectively, corresponding to approximately 85% of the Coulomb barrier. Deexcitation gamma rays have been detected by the Gammasphere spectrometer. Lifetimes of excited states could be calculated from observed Coulomb excitation cross sections. For the $2^+_{1,\mathrm{ms}}$ state in ^{148}Sm the $M1$ strength for its decay to 2^+_1 could be deduced and compared to previous measurements [2]. Results of the analysis of ^{148}Sm will be presented. [1] N. Pietralla et al., Prog. Part. Nucl. Phys. **60**, 225 (2008); [2] T. C. Li et al., Phys. Rev. C **71**, 044318 (2005); Supported by the DFG

HK 67.58 Th 14:00 Audi-Max

Long-lived isomeric states in neutron-deficient thorium isotopes? — •Johannes Lachner, Iris Dillmann, Thomas Faestermann, Gunther Korschinek, Mikhail Poutivtsev, and Georg Rugel — Technische Universität München

In a recent publication Marinov et al. (Phys. Rev. C 76, 021303(R), 2007) reported that isomeric states should exist in the neutron-deficient thorium-isotopes ^{211}Th, ^{213}Th, ^{217}Th and ^{218}Th. These isotopes were found by use of a conventional mass spectrometer in abundances of 10^{-11} relative to ^{232}Th in a natural sample of thorium. Therefore they should be of primordial origin and have minimum half-lives of several 100 million years. This is surprising, as the ground-states of these α-emitters have lifetimes shorter than seconds and are surrounded by other short-lived α-emitting nuclei. So their production and half-life can not be explained within current models of nuclear and astrophysics. With the method of Accelerator Mass Spectrometry (AMS) at the Maier-Leibnitz-Laboratory in Munich this search could be repeated with higher sensitivity and complete reduction of background due to molecules. Hereby none of the four neutron-deficient thorium isotopes could be detected, the new upper limit for their abundance is an order of magnitude below the postulated value. The work was supported by DFG through EXC 153.

HK 67.59 Th 14:00 Audi-Max

Quasifree scattering with electrons at ELISe/FAIR experiment — •Javier R. Vignote[1] and Haik Simon[2] — [1]Instituto de Estructura de la Materia, CSIC, Serrano 123, E-28006, Madrid, Spain — [2]GSI Helmholtz Centre for Heavy Ion Research GmbH, Planckstrasse 1, D-64291, Darmstadt, Germany

An electron-ion scattering experiment ELISe is a part of the installations envisaged in the new experimental storage ring at the international facility for antiproton and ion research (FAIR) in Darmstadt, Germany. It offers the worldwide unique opportunity to use electrons as probe particle in investigations of the structure of exotic nuclei.

The use of electrons as a probe particle provides a powerful tool for examining nuclear structure. The most reliable evidence how nuclei look like originates from electron scattering. Up to now, the scattering of electrons is still restricted to stable isotopes. ELISe aims at an extension of this powerful method to nuclei beyond the valley of stability. ELISe will be a unique and unprecedented tool for precisely measuring nuclear charge distributions, transition current matrix elements and spectroscopic factors. In this talk I will present a review of the electro-nuclear coincidence experiments from a theoretical point of view and I will focus my attention to the inverse or beam to beam kinematics set up that will be used at the ELISe experiment.

HK 67.60 Th 14:00 Audi-Max

The scientific program of EAGLE campaign on the beam of the Warsaw Cyclotrone — •Julian Srebrny — Heavy Ion Laboratory, University of Warsaw, Poland

(on behalf of the EAGLE collaboration)

The scientific program of the EAGLE collaboration (central European Array for Gamma Levels Evaluation)will be presented. The EAGLE collaboration was formed by 8 Polish Institutes of Nuclear Physics and CEA Saclay, Lund University, University of Sofia, University of Brighton and ATOMKI Debrecen.

The new multidetectors array for γ-ray spectroscopy in Warsaw will be described and shown.

The main studies will be concentrated on:

1. DSAM and RDDSAM picosecond life-time measurements for systematic studies of chiral symmetry breaking as a new dynamic variable important for the structure of odd-odd nuclei

2. the detailed experimental study of weakening of the K-forbidness due to the triaxialityin the A *130 region by gamma-gamma and electron-gamma coincidences

3. hyperfine interaction and g-factor measurements combined with RDDSAM

4. COULEX and others

HK 67.61 Th 14:00 Audi-Max

Self-Consistent Covariant Descriptions of Spin-Isospin Resonances — •Haozhao Liang[1,2], Nguyen Van Giai[1], and Jie Meng[2] — [1]Institut de Physique Nucléaire, 91406 Orsay, France — [2]School of Physics, Peking University, Beijing 100871, P.R. China

Spin-isospin excitations in nuclei become one of the central topics in nuclear physics and astrophysics. Basically, a systematic pattern of the energy and collectivity of these resonances could provide direct information on the spin and isospin properties of the in-medium nuclear interaction. Furthermore, the neutron skin thickness can be determined indirectly by the sum rule of spin-dipole resonances (SDR) or the excitation energy difference between isobaric analog states (IAS) and Gamow-Teller resonances (GTR). More generally, spin-isospin resonances allow one to attack other kinds of problems outside the realm of nuclear structure, like the β-decay of nuclei which lie on the r-process path of stellar nucleosynthesis, and so on.

In this work, a fully self-consistent charge-exchange relativistic random phase approximation (RPA) based on the relativistic Hartree-Fock (RHF) approach is established. The self-consistency is verified by the so-called IAS check. The excitation properties and the non-energy weighted sum rules of the GTR and SDR are well reproduced in the doubly magic nuclei ^{48}Ca, ^{90}Zr and ^{208}Pb without any readjustment of the particle-hole residual interaction. Furthermore, the

importance of exchange diagram contributions is demonstrated.

Reference: H. Liang, N. Van Giai, J. Meng, Phys. Rev. Lett. 101, 122502 (2008).

HK 67.62 Th 14:00 Audi-Max

Nonperturbative renormalization group for many fermion systems: from cold atoms to hadron matter — •BORIS KRIPPA — University of manchester, manchester, m13 9pl

The application of the nonperturbative renormalisation group to many-fermion systems with a short-range attractive force is studied. Assuming an ansatz for the effective action with fermions and effective bosons, describing pairing effects, a set of approximate flow equations for the effective coupling including boson and fermion loop contribution has been derived. The phase transition to a state with broken symmetry is found at a critical value of the running scale. Both BEC and BCS regimes as well as crossover between them are identified and studied. The known mean-field results in both regimes are recovered if boson-loop effects are omitted. The developed approach is applied to the variety of many fermion systems such as nuclear/neutron/quark matter and cold fermionic atoms.

HK 67.63 Th 14:00 Audi-Max

Coulomb dissociation reactions on Mo isotopes for astrophysial applications — •OLGA ERSHOVA for the LAND-S287-S295-Collaboration — Institut für Kernphysik, Johann Wolfgang Goethe-Universität Frankfurt am Main, Frankfurt a. M., Germany

Photo-dissociation reactions are important for explaining abundances of the nuclei produced via the so-called p-process, which takes place in Type II supernova explosions. Theoretical calculations of the isotopic p-nuclei abundances require a huge reaction network linking thousands of isotopes, where most of the reaction rates have to be derived from theory. However, it's important that as many rates as possible are measured experimentally to provide pivot points for the calculations. In all present models, a significant underproduction of Mo and Ru p-nuclides is observed. At the same time, ^{92}Mo has one of the highest cosmic abundances of all p-nuclei.

At the SIS/FRS/LAND facility at GSI (γ,n) reactions on the stable ^{92,94,100}Mo and the unstable ^{93}Mo isotopes were studied. The experiment was performed in inverse kinematics using the Coulomb dissociation method. The setup provides a possibility to identify the outgoing nucleus with respect to A and Z. Together with a neutron hit in the LAND detector, it allows to tag the proper reaction channel. Gamma-rays emitted by the de-exciting nucleus were measured with the 2π CsI gamma spectrometer. Current status of the analysis, with a focus on the gamma detection, will be presented.

This project is supported by the HGF Young Investigators Project VH-NG-327.

HK 67.64 Th 14:00 Audi-Max

The ^{15}N(p,γ)^{16}O reaction studied at LUNA — •DANIEL BEMMERER for the LUNA-Collaboration — Forschungszentrum Dresden-Rossendorf (FZD), Dresden, Germany

The ^{15}N(p,γ)^{16}O reaction lies at the intersection of the first and second CNO cycle of hydrogen burning. Recent R-matrix extrapolations suggest that its cross section may be lower by about a factor two with respect to previous work. Here we show new, direct experimental data on this reaction obtained at the LUNA 400 kV accelerator deep underground in the Gran Sasso laboratory in Italy.

HK 67.65 Th 14:00 Audi-Max

α-decay half-lives for neutral atoms and bare nuclei — •F. FARINON for the E073-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — Justus-Liebig-Universität, Gießen, Germany

The influence of the bound electron cloud on the α-decay constant λ has been discussed theoretically since the late 50s. Precise Q-values and α-decay half-lives of fully stripped ions are important to obtain an unambiguous determination of the electron screening energy, thereby deducing reliable reaction rates in stellar environments. Recently, the measurements of α-decay half-lives are feasible also for highly-charged radioactive nuclides. Using a ^{238}U beam at relativistic energies at the present FRS-ESR facility at GSI it is possible to produce, efficiently separate and store highly charged α-emitters. Few candidates have been selected for the proposed investigations and will be studied by using the Schottky Mass Spectrometry technique. In order to establish a solid reference data set, lifetime measurements of the corresponding neutral atoms have been performed directly at the FRS by implanting the separated ions into an active silicon stopper. These results will be reported.

HK 67.66 Th 14:00 Audi-Max

Simulation und Entwicklung eines Monitordetektors zur Messung der Intensität der fensterlosen Tritiumquelle am KATRIN-Experiment — •DETLEF MAUREL für die KATRIN-Kollaboration — Universität Karlsruhe (TH), Institut für experimentelle Kernphysik

Ziel des Karlsruher Tritium-Neutrinoexperimentes (KATRIN) ist die direkte und modellunabhängige Bestimmung der Neutrinomasse aus der Kinematik des Tritiumzerfalls mit einer Sensitivität von $m_\nu < 0.2\,\mathrm{eV}$. KATRIN basiert auf einer fensterlosen gasförmigen Tritiumquelle und einem System aus zwei Spektrometern nach MAC-E-Filter-Prinzip. Im rückwärtigen Abschnitt der Tritiumquelle befindet sich eine goldbeschichtete Endplatte, die zugleich das elektrostatische Potential der Quelle definiert. Die Quellaktivität von 10^{11} Bq soll mittels der rückwärtig emittierten Zerfallselektronen während der Messung mit einem Monitor-Detektor überwacht werden. Eine Möglichkeit liegt im Nachweis der Brems- und Röntgenstrahlung, die von den Elektronen in der Endplatte erzeugt wird. Inhalt des Posters sind Simulation und experimentelle Untersuchung verschiedener Endplattentypen und Nachweismethoden.

Gefördert vom Sonderforschungsbereich Transregio 27 („Neutrinos and Beyond“) Teilprojekt A2.

HK 67.67 Th 14:00 Audi-Max

Measurement of the low energy secondary electron emission rate induced by cosmic rays. — •HENRIK ARLINGHAUS, MARCUS BECK, CHRISTIAN WEINHEIMER, HANS-WERNER ORTJOHANN, VOLKER HANNEN, and HELMUT BAUMEISTER — Institut für Kernphysik, Universität Münster

The KATRIN (KArlsruhe TRItium Neutrino) experiment intends to determine the mass of the electron antineutrino to within 0.2 eV/c^2 (90% C.L.) via a measurement of the endpoint region of the tritium beta-decay spectrum. This requires a background rate of some few millihertz. In order to understand this background, a GEANT4 simulation of the electron background in the main spectrometer was written. The low energy secondary electron emission rate induced by cosmic muons in stainless steel, was determined experimentally, and used in the simulation.

We will present the design and results of an experiment at the University of Münster which we used to measure the number of electrons which were ejected by cosmic muons passing through a stainless steel electrode. Using plastic scintillators, the incident muon angle of the triggering muons was varied. The ejected electrons were accelerated and focused onto a silicon PIN detector, and their energy as well as arrival time distribution was recorded.

Preliminary results show a secondary electron production rate of under 5% for all measured angles.

This project is supported by BMBF under contract number 05A08PM1.

HK 67.68 Th 14:00 Audi-Max

Atomic Parity Violation in one Single Trapped and Laser Cooled Radium Ion: A Probe of Electroweak Running — •G.S. GIRI, O. BOELL, K. JUNGMANN, B.K. SAHOO, R.G.E. TIMMERMANS, O.O. VERSOLATO, L.W. WANSBEEK, and L. WILLMANN — KVI, University of Groningen, The Netherlands

One single-trapped and laser cooled radium ion is an ideal candidate to investigate atomic parity non-conservation (APNC). APNC can serve as a low energy test of the Standard Model of particle physics. We aim for a precision measurement of the electroweak mixing angle, by probing the differential light shift of the 7S and 6D Zeeman sublevels. This shift is caused by the interaction of the ion with an off-resonant laser light field. With precision RF spectroscopy and subsequent electron shelving, the differential splitting can be determined to sub-Hertz accuracy. Recent calculations show that Ra^+ is a superior candidate for probing APNC [1]. With an almost identical set-up and using the electron shelving technique, ultra-narrow transitions in this ion can be exploited for an all optical, high stability frequency standard clock. We have succeeded in the production and subsequent slowing down of radium isotopes around ^{213}Ra. Further progress has been made in the development of ion traps and the necessary high precision optical laboratory. Laser spectroscopy of Ra^+ and the first ever trapping of this particle are being prepared.

[1] L.W. Wansbeek et al. Phys. Rev. A 78, 050501 (2008)

HK 67.69 Th 14:00 Audi-Max

Charge Symmetry Breaking in dd collisions with WASA-at-COSY* — •Wojciech Wglorz — Institut für Kernphysik and Jülich Center for Hadron Physics, Forschungszentrum Jülich, D-52425 Jülich, Germany — Nuclear Physics Department of the University of Silesia, Katowice

Charge symmetry is a special case of isospin symmetry defined as an invariance under the rotation of 180^o around the second axis in isospin space. The isospin symmetry is broken on the QCD level due to the up and down quark mass difference and electromagnetic interactions. In contrast to isospin violation the Charge Symmetry Breaking (CSB) is not dominated by electro-magnetic interactions and, thus, well suited to study the QCD quark mass term.

Based on the recent high-precision measurements of CSB in np $\rightarrow d\pi^0$ at TRIUMF and dd $\rightarrow \alpha\pi^0$ at IUCF significant progress in a common understanding of CSB within the framework of effective field theory has been achieved. Moreover, certain parameters have been identified necessary for a further theoretical analysis, like dd interactions in initial state state or p-wave contributions in dd $\rightarrow \alpha\pi^0$. This has motivated a program on CSB in dd collisions at WASA-at-COSY. First experiments have been carried out since the end of 2007. A general outline of the program and the current status will be presented.

*Supported by FZ Jülich, BMBF, and Wallenberg Foundation

HK 67.70 Th 14:00 Audi-Max

Studying the Unruh Effect using high-power, short-pulse lasers* — •C. Lang[1], P.G. Thirolf[1], D. Habs[1], A. Henig[1], D. Jung[1], D. Kiefer[1], J. Schreiber[1,2], and R. Schuetzhold[3] — [1]LMU München — [2]Imperial College, London/UK — [3]Univ. Duisburg-Essen

Understanding the quantum vacuum is one of the key challenges of fundamental physics. Electrons accelerated in the strong fields of high intensity lasers will experience a large acceleration granting access to the Unruh effect, where an accelerated electron will create entangled pairs of Unruh photons via non-inertial scattering of virtual photons from vacuum fluctuations. Using laser accelerated low-energy electrons ($\approx$ 1 MeV) and counter-propagating brilliant X-rays ($\approx$ 20 keV) acting as an undulator will accelerate the electrons such that entangled Unruh photon pairs of ca. 160 keV each will be created. The X-rays will be produced via Compton backscattering of optical photons off dense electron sheets, acting as relativistic mirrors [1]. About 10^3 Unruh photons/s are expected with a ratio between Unruh photon pairs and background from classical Larmor radiation of ≈ 0.004 [2]. Detection of the Unruh photons will be performed via Compton polarimetry using a 2D segmented planar Ge detector (20 mm thick) and a segmentation of 64 x 64 strips (width 1 mm). Unruh photons will be identified according to their specific energy, polarization and angular characteristics.

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

[1] D. Habs et al., Appl. Phys. B 93, 349 (2008).
[2] P.G. Thirolf et al., subm. to Eur. Phys. Journ. D (2008).

HK 67.71 Th 14:00 Audi-Max

Search for Symmetry Breaking Patterns with WASA-at-COSY — •Christian Pauly for the WASA-at-COSY-Collaboration — Institut für Kernphysik and Jülich Center for Hadron Physics, D-52425 Jülich, Germany

Key issues of the WASA-at-COSY physics program are the study of symmetries and symmetry breaking patterns in low energy hadronic processes within the non-perturbative regime of QCD. High statistic measurements of η and $\eta\prime$ meson decays are used to search for violations of isospin symmetry, and to test conservation of fundamental C, P and CP symmetries. A precise measurement of charge symmetry breaking in the isospin violating process $dd \rightarrow \alpha\pi^0$ is another important part of the physics program.

During the last year data have been obtained on several of the WASA key experiments. In particular, in fall 2008, a large data sample of $\geq 10^7$ η-decays was produced in the reaction $pd \rightarrow {}^3He\ \eta$. The reaction allows for the tagging of the produced η mesons merely by identification of the ^3He particle, covering all η decay channels. A second η production run on $pp \rightarrow pp\ \eta$ focused on the study of η decays into charged particles, especially $\eta \rightarrow \pi^+\pi^-e^+e^-$, which allows to search for an unconventional form of flavour conserving CP violation.

We present an overview of the experiment and status of the analysis.

— supported by BMBF, DAAD and Wallenberg Foundation

HK 67.72 Th 14:00 Audi-Max

Fundamental symmetries in ^{21}Na decay — •D.J. van der Hoek, R. Hoekstra, K. Jungmann, W.L. Kruithof, C.J.G. Onderwater, M. Sohani, L. Willmann, and H.W. Wilschut — KVI, University of Groningen, Groningen, The Netherlands

The β-ν correlations in β-decay allows searching for contributions that go beyond the V-A description of the Standard Model for the electroweak interaction. We are developing an experimental setup to measure correlations in the β-decay of ^{21}Na. By trapping the radioactive atoms, the recoiling nucleus (kinetic energy < 230 eV) can be measured in a reaction microscope in coincidence with the emitted β particle. The first step is to study β-ν correlations that allows to set limits on scalar and tensor contributions. By polarizing the parent nucleus it becomes possible to search for time reversal violation. The production and trapping of ^{21}Na has been accomplished. Details of the setup and the status of this phase of the program will be described.

HK 67.73 Th 14:00 Audi-Max

Tracking Simulations for the WITCH Experiment — •Jonas Mader[1], Marcus Beck[1], Peter Friedag[1], Christian Weinheimer[1], Nausikaa Geeraert[2], Nathal Severijns[2], Michael Tandecki[2], Emil Traykov[2], Simon van Gorp[2], Frederik Wauters[2], Alexander Herlert[3], and ISOLDE Collaboration[3] — [1]Institut für Kernphysik, WWU Münster, Wilhelm-Klemm Str. 9, 48149 Münster, Germany — [2]Instituut voor Kern- en Stralingsfysica, K.U.Leuven, Celestijnenlaan 200D, B-3001 Leuven, Belgium — [3]CERN, CH-1211 Geneve 23, Switzerland

The WTICH experiment will measure the energy spectrum of recoil ions after a beta decay. From such a recoil energy spectrum the beta-neutrino angular correlation, which is sensitive to exotic interactions, will be extracted. For a precise determination of the beta-neutrino angular correlation coefficient a with $\Delta a < 0.5\%$ the systematic uncertainties have to be understood in detail. To this end we perform particle tracking simulations from the source to the detector. The simulation package was originally developed for electrons and used in the KATRIN experiment. We adapted it for ions and use it to understand the transmission and reponse of the WITCH set-up, to investigate the effect of modifications of the set-up, to determine suitable configurations of the electrode potentials at WITCH and to analyse the data.

We will present the simulation package, show its functions using some select examples and give an outlook on the planned simulations.

This project is supported by BMBF under contract number 06MS270.

HK 67.74 Th 14:00 Audi-Max

Towards high-precision polarimetry for an EDM search on the deuteron — •Marlene da Silva e Silva, Klaus Jungmann, Wilbert Kruithof, Gerco Onderwater, Oscar Versolato, Hans Wilschut, and Lorenz Wilmann — KVI and University of Groningen, Groningen, The Netherlands

A finite Electric Dipole Moment (EDM) in any fundamental system would constitute a signal for New Physics. The deuteron presents itself as an optimal candidate due to its high sensitivity for CP odd parts of nuclear forces, together with being easily polarizable and having a small anomalous magnetic moment. A new storage ring technique is being developed, for which a small change in the vertical polarization would be a signal of a non-zero EDM. A novel polarimeter concept is under investigation. Besides being highly efficient, this polarimeter allows for continuous monitoring of the beam polarization, guaranteeing optimal sensitivity. Detailed studies on systematic error control, in addition to the measurement of cross sections and analyzing powers, were carried out at KVI-Groningen. Efficiency measurements were conducted at COSY-Jülich yielding a high efficiency up to 1.5%. The (statistics limited) ability to track changes in polarization at the level of a few hundred parts-per-million has been demonstrated. Further studies and developments to meet the final goal of sub-part-per-million sensitivity are in progress.

HK 67.75 Th 14:00 Audi-Max

Efficiency determination of the neutron detector ball at the S-DALINAC* — •Maksym Chernykh, Anna Maria Heilmann, Peter von Neumann-Cosel, and Achim Richter — Institut für Kernphysik, Technische Universität Darmstadt

Nuclear incompressibility (k_∞) is a fundamental quantity defining the

equation of state of nuclear matter. It can be determined by studying isoscalar giant monopole and dipole resonance using coincidence inelastic electron scattering of the type (e,e′n). For that purpose a neutron detector ball was newly designed and built at the S-DALINAC [1]. It consists of 13 BC501A scintillation cells and covers a solid angle up to 1.3π. Before the first experiments start, the properties of the new detector need to be determined. This work represents the neutron efficiency determination of the scintillation cells. For the measurements a ^{252}Cf source with a well known neutron energy distribution was used. The neutron energy was determined using the neutron time of flight relative to the fission fragments. The obtained results have been compared with Monte Carlo simulations using the NRESP code.

[1] M. Chernykh, Doctoral thesis D17, TU Darmstadt (2008).

*Supported by the DFG through SFB 634.

HK 67.76 Th 14:00 Audi-Max

Surface characterisation and surface protection of Germanium detectors — •Tobias Engert[1], Ivan Kojouharov[1], Thomas Krings[2], and Jürgen Gerl[1] — [1]GSI, 64291 Darmstadt, Germany — [2]SEMIKON Detector GmbH, 52428 Juelich, Germany

Abstract: The project includes the characterization of the surfaces of Ge detectors through all necessary processing steps, from the raw crystal to the final detector diode. The aim is to improve the mechanical structure and to reduce surface contaminations, by applying optimized treatment methods. Moreover, a methodology for the design of high purity Germanium detectors is presented. It is motivated by the need for a new mechanical treatment procedure with manufacturing methods for better quality Germanium surfaces and increased cost-efficiency. For the characterisation small Germanium detectors with different surface quality have been prepared and investigated with a Scanning Tunnelling Microscope, an Atomic Force Microscope and a Profiler.

HK 67.77 Th 14:00 Audi-Max

Characterization of LN2 Cooled APDs for Single Photon Counting Applications — Denis Anielski[1], Wladimir Buglak[1], Daniel Hampf[2], Volker Hannen[1], •Raphael Jöhren[1], and Christian Weinheimer[1] — [1]Institut für Kernphysik, Universität Münster — [2]Institut für Experimentalphysik, Universität Hamburg

Avalanche Photo Diodes (APDs) operated near LN2 temperature are one of the technologies under investigation for the detection of low levels of fluorescence light produced in the laser spectroscopy experiment SPECTRAP at GSI. Measurements of hyperfine transitions in highly charged ions require single photon detection capabilities from the UV to the near infrared. With high quantum efficiencies in the visible and NIR region (up to 1020 nm), APDs are a possible candidate for measurements of the hyperfine transitions e.g. in $^{207}Pb^{81+}$. Problems arise due to large dark count rates of the APDs when operated at room temperature or with modest cooling only. To characterize dark current, gain and signal to noise ratio of the detectors as a function of temperature and bias voltage, a LN2 cooled cryogenic test bed has been set up at the nuclear physics institute in Münster. To minimize the noise contribution from external sources a low noise preamplifier board tailored to operation at low temperatures inside the vacuum has been developed based on the AMPTEK A250 chip. We will present results regarding the performance of the preamp design and the temperature behavior and photon detection efficiency of the tested APDs. This work is supported by an R&D contract with GSI.

HK 67.78 Th 14:00 Audi-Max

Dose and Shielding Calculation of Galactic Cosmic Ray Using FLUKA Mont Carlo Code — Hamide B. jalali[1], •Golamreza Raisali[2], Amirhosein Feghhi[3], and Alireza Babazade[2] for the Alborz-Collaboration — [1]Physics department, university of Qom, Qom, Iran — [2]Radiation Applications Research School, Nuclear Science and Technology Research Institute, Atomic Energy Organization of Iran, Tehran, Iran — [3]Physics and Nuclear engineering department, Amirkabir University, Tehran, Iran

Astronauts* exposure to space radiation is a limiting factor for long-term missions. Therefore shielding is a critical issue in space mission success. In this work the FLUKA Monte Carlo code has been coupled with simple models of the spacecraft and equivalent phantom to calculate skin averaged doses due to exposure to Galactic Cosmic Rays (GCR) beyond various thicknesses of aluminum and polyethylene shields. Simulations have been performed for the most abundant elements including H, He, C and Fe ions. The spectra of these ions have been taken from Badhwar-O*Neill*s model, and LET distribution of the ions and electrons calculated using SRIM and ESTAR computer programs, respectively. It has been observed that GCR absorbed dose behind the shields remained approximately constant with increasing shield thicknesses, but dose equivalent shows a slight decrease. It is also found that although polyethylene is a more effective GCR shield than aluminum as indicated in the results of similar investigations, but the practical thicknesses of polyethylene are still insufficient to shield high energy GCR ions encountered in long-term space missions.

HK 67.79 Th 14:00 Audi-Max

Exploring the Radiation Hardness of Lead Glass Detectors used in the COMPASS Experiment — •Daniel Chaberny — Institut für Kernphysik, Universität Mainz, Johann-Joachim-Becherweg 45, 55099 Mainz

In order to study the influence of possible radiation damage on the performance of the lead glass detectors used in the electromagnetic calorimeters of the COMPASS spectromter at CERN, lead glass modules were irradiated. irradiated with gamma-rays from a 60Co source and high energy electrons delivered by the MAMI accelerator. Two different lead glass types (TF1 and SF57) were investigated. We measured the thermoluminescence after irradiation and determined the natural recovery from radiation damage at room temperature as well as the recovery induced by optical bleaching. We will also discuss consequences for the operation of this detector in future runs of COMPASS with high beam intensities.

supported by BMBF under the contract 06MZ224

HK 67.80 Th 14:00 Audi-Max

Actinides AMS measurements at CIRCE in Caserta (Italy) — •Mario De Cesare[1,3], Nicola De Cesare[2,3], Antonio D'Onofrio[1,3], Lucio Gialanella[3], Yonjing Guan[1,4], Antonio Petraglia[1], Francesca Quinto[5], Vincenzo Roca[3,6], Detlef Rogalla[1,3], Carlo Sabbarese[1], and Filippo Terrasi[1,3] — [1]CIRCE, INNOVA, and DSA (SUN), Caserta, Italy — [2]CIRCE, INNOVA, and DSV (SUN) , Caserta, Italy — [3]INFN Sezione di Napoli, Napoli, Italy — [4]ICTP, Trieste, Italy — [5]Institut für Isotopenforschung und Kernphysik, Universität Wien, Vienna, Austria — [6]DSF, Università Federico II , Napoli, Italy

Nuclear Weapons (NW) use the destructive effects of supercritical chain reactions while Nuclear Power Plants (NPP) convert nuclear energy in electric power by thermal one. These operations lead to the release in the environment a wide range of radioactive nuclides that are present in environmental samples at ultra trace levels. Their detection requires the resolution of mass spectrometric techniques, but only AMS allows the sensitivity needed. In order to perform the isotopic ratio measurements of actinides, e.g. 236U/238U and xPu/239Pu, an upgrade of the CIRCE accelerator in Caserta, Italy, has been planned. The main difficulty of the AMS measurement of 236U and of xPu isotopes is the intense neighbouring beam of 238U. We report the results of simulations aimed to define the best ion optics and to understand the origin of background ions and test measurements are shown. A high resolution TOF-E detector system is described, designed to identify the rare isotopes and the unsuppressed interfering ions.

HK 67.81 Th 14:00 Audi-Max

Conceptual Design of a Luminosity Monitor for the PANDA Experiment using Elastic Antiproton-Proton Scattering — •Tsitohaina Randriamalala, James Ritman, and Tobias Stockmanns for the PANDA-Collaboration — Institute for Nuclear Physics, Forschungszentrum Jülich, Germany

The PANDA experiment requires a very precise measurement of both the absolute and relative the luminosity. This will be achieved by luminosity monitor by measuring the elastic $\bar{p}p$ scattering process at low momentum transfer. Taking the detector and the accelerator system geometry into consideration, the detector will measure the forward outgoing antiproton. As a result, it will be located at about 10m downstream of the target. At this position the luminosity monitor measures particles emitted at 3-8mrad with respect to the beam axis. The detector consists of a sequence of four planes of double sided silicon strip detectors. The planes are separated by 20 cm along the beam direction. Each plane consists of 4 wafers 2cm x 5cm x 300μm, with 50 μm pitch arranged radially to the beam axis and together placed in the vacuum. Simulations have been done in order to reconstruct the angle of the scattered antiprotons. Most of the charge deposited in one sensor is collected by no more than two strips. After smearing the charge deposited, the reconstruction of the mean position of the hit in the cluster were carried out. Position resolutions of about 15μm

for strip multiplity one and about 3μm for strip multiplicity two are achieved.

Supported in part by the DAAD and FZ-Jülich

HK 67.82 Th 14:00 Audi-Max

Study of transmission and light yield of an n=1.07 silica aerogel — •L. Debenjak[1], S. Sirca[1], and P. Achenbach[2] for the A1-Collaboration — [1]Jožef Stefan Institute, Ljubljana, Slovenia — [2]Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz

The large momentum acceptance of the Kaos spectrometer at the Mainz Microtron MAMI requires the discrimination between kaons and pions for momenta $\geq 1\,\mathrm{GeV}/c$. Silica aerogel with refractive index $n \sim 1.07$ has been chosen as a Čerenkov radiator for pion suppression. The area to be covered by the aerogel ($H \times W \sim 40 \times 200\,\mathrm{cm}^2$) is governed by the focal plane of the magnetic spectrometer.

A prototype detector with two aerogel tiles of $d = 2\,\mathrm{cm}$ thickness and $20 \times 10\,\mathrm{cm}^2$ total area was designed, built and tested. Modifications to the basic geometry of the prototype were tried, e.g. different kinds of polished aluminum faces were used in the interior in order to improve the reflection of photons towards the PMTs.

The behaviour of the prototype has been simulated by using Litrani, a C++/ROOT-based program. Different parameters of the aerogel (absorption and scattering) have been measured and used as input data to the simulation code. The characteristic lengths were of the order of 10 cm in the wavelength range of the produced Čerenkov photons.

During two beam-times in Oct. and Nov. 2008 at MAMI the performance of the prototype was measured with electrons, pions, and protons. The absorption and scattering losses in the aerogel tiles lead to a very low number of deteced photons. Detection efficiencies were determined at different threshold settings and particle momenta.

HK 67.83 Th 14:00 Audi-Max

The new readout electronics for the HADES RICH detector* — •M. Böhmer, J. Friese, R. Gernhäuser, P. Huck, M. Jurkovič, L. Maier, and M. Weber — Technische Universität München, Physik-Dept. E12, 85748 Garching

A multiwire proportional chamber with CsI photocathode is used for Cherenkov photon detection in the RICH of the dielectron spectrometer HADES at GSI, Darmstadt. Within the ongoing upgrade of the HADES data acquisition system we have developed a new readout chain for the 28500 pads of the photon detector. It is based on frontend amplifier cards utilizing the APV25 chip with operation parameters adopted for gaseous detectors. The analog output data is digitized and further processed by new FPGA controlled ADCM cards with connectivity to the TRB Net[1]. The new electronics is designed for a readout rate of 100kHz (peak) and 20kHz (sustained) for the whole detector system. We will present the concept and show first results of full system tests.

[1] I. Fröhlich *et al.*, IEEE Trans. Nucl. Sci. 55 (2008) 59.

* supp. by BMBF(06MT238), GSI, DFG (Exc.-Clust. 153-Universe)

HK 67.84 Th 14:00 Audi-Max

Development of online event selection in CBM — •Ivan Kisel — (for CBM Collaboration) — GSI, Planckstr. 1, 64291 Darmstadt

Large track densities together with the presence of a non-homogeneous magnetic field make the online reconstruction and selection of events in the CBM experiment complicated.

Track finding in the silicon tracker is based on a cellular automaton. To achieve a high track finding efficiency a Kalman filter fitting algorithm is intensively used within the track finder.

After a significant memory optimization and a comprehensive numerical analysis, the Kalman filter based track fitting algorithm has been vectorized using inline operator overloading to be flexible with respect to any CPU family used for data reconstruction. Because of all these changes the SIMDized Kalman filter based track fitting algorithm takes 1 us per track that is 10000 times faster than the initial version. Porting the algorithm to a Cell Blade computer gives another factor of 10 of the speedup.

The cellular automaton track finder of the CBM experiment has been also significantly reworked in order to be SIMDized. The SIMDized Kalman filter based fitting routines have been included into the track finder. The SIMDized cellular automaton track finder shows 1000 times increase of the reconstruction speed with respect to the initial scalar version running on the same Pentium 4 based computer. Such significant speed-up of the track finder has also demonstrated the possibility of on-line data selection at the expected input rate of 10^7 events per second.

HK 67.85 Th 14:00 Audi-Max

Development for PRESPEC : New front end electronic for Multi Sampling Ionization Chambers of the GSI-fragment separator — •Stephane Pietri, Juergen Gerl, Nik Kurz, Chiara Nociforo, Henning Schaffner, and Haik Simon — GSI, Planckstrasse 1, 64291 Darmstadt, Germany

To study detailed structure effects during in-beam gamma spectroscopy experiments at the GSI fragment separator high particles rates are needed at the final focal plane. The use of new position detector (TPC [1]) having higher rate capability than the previous Multi-Wire Proportional Counter put the ionization chambers (MUSICs) used for the delta-E measurement as the limiting factor. The current electronics used for those detector does not allow to sustain rates of up to 100 kHz that the coming experimental program will request. Indeed at those rates the analog electronic is not able to disentangle pile-up events and thus give a wrong Z identification for the incoming nucleus. The ongoing work on new digital electronic and on signal characterization to allow higher rates capability of those detectors will be presented.

[1] : V. Hlinka et al. NIMA 419 (1998) 503

HK 67.86 Th 14:00 Audi-Max

New Readout Concept for the Calorimeter of the Crystal Barrel Experiment at ELSA — •Christian Honisch for the CBELSA/TAPS-Collaboration — HISKP, Nußallee 14-16, 53115 Bonn

The Crystal Barrel experiment at ELSA in Bonn is a double polarized photo-production experiment for hadron spectroscopy. Its EM-calorimeter is build-up of 1380 CsI crystals.

At present the CsI signals are read out with a PIN photodiode. Triggering on the calorimeter is not possible in this set-up, because the signals from the charge sensitive amplifier are slow. In the upgrade of the experiment the read-out eletronics is to be extended by a 1$^{\mathrm{st}}$ level trigger for the CsI crystals. While providing fast timing signals, the new read-out system has to achieve at least the same energy resolution as the existing one.

The large risetime of the CsI crystals forces a trade-off between time resolution and latency. Avalanche photodiodes, silicon photomultipliers and the existing PIN-photodiodes, together with new read-out electronics, have been tested to generate low latency timing signals.

In this poster, results from the three sensors will be presented and compared.

HK 67.87 Th 14:00 Audi-Max

Der Myonen-Detektor des CBM Experiments bei FAIR — •Anna Kiseleva[1,2], Andrey Lebedev[1,3] und Dipanwita Dutta[1] für die CBM-Kollaboration — [1]GSI, Darmstadt, Deutschland — [2]PNPI, Gatchina, Russland — [3]JINR, Dubna, Russland

Eine der Herausforderungen des CBM Experiments ist die Messung von Myonenpaaren aus Zerfällen von Vektormesonen (ρ, ω, ϕ, J/ψ, ψ'), die in Schwerionenstößen erzeugt werden. Die Multiplizität der Myonenpaare variiert zwischen 10-3 und 10-9 pro zentralem Au+Au Stoß, wobei in jeder Reaktion bis zu 1000 geladene Hadronen emittiert werden. Die Unterdrückung der Hadronen und der Nachweis der Myonen werden durch ein aktives Absorbersystem erreicht, das aus mehreren Lagen Eisen und Detektorebenen besteht und die Spuren aller geladenen Teilchen rekonstruiert. Die Nachweis-Effizienzen und die Signal-zu-Untergrund Verhältnisse werden in Simulationsrechnungen untersucht, die auf realistischen Annahmen bezüglich der Teilchenmultiplizitäten und der Detektoreigenschaften basieren. Die Ergebnisse der Simulationen für FAIR Energien von 8 bis 35 AGeV, eine Triggerstudie und die Optimierung des Detektor-Absorber Systeme werden vorgestellt. * Supported by EU-FP6 HadronPhysics

HK 67.88 Th 14:00 Audi-Max

GEANT4 Simulations for the R^{3}B Calorimeter Prototypes — •Douglas DiJulio, Joakim Cederkall, Pavel Golubev, and Bo Jakobsson — Physics Department, Lund University, Sweden

One of the main detectors of the R^{3}B experiment at FAIR will be a total gamma ray absorption calorimeter. The detector will consist of about 5000 crystals which surround the target position. One demonstrator of the detector, which consists of a cluster of 5x3 CsI(Tl) crystals, has been constructed at Lund University. Proton and γ-ray in beam tests of this demonstrator are planned for 2009. In order to prepare for these tests, GEANT4 simulations have been carried out to

understand the response of the crystals. The total energy deposited, the crystal multiplicities, and energy deposition distributions in the array have been calculated. The light collection in a single CsI(Tl) crystal has also been investigated experimentally with low energy γ-rays from radioactive sources and will be compared with GEANT4 simulations.

HK 67.89 Th 14:00 Audi-Max

Simulations of nuclear reactions for a future HIE-ISOLDE Spectrometer — •Gry Tveten[1,3], Joakim Cederkall[2,3], and Yorick Blumenfeld[3] — [1]University of Oslo, Norway — [2]Lund University, Sweden — [3]CERN, Switzerland

The planned High Intensity and Energy (HIE) upgrade of the radioactive beam facility ISOLDE will enable post-acceleration of radioactive beams up to an energy of about 10 MeV/u, thus opening the door to nuclear reaction studies. In the case of transfer reactions in inverse kinematics a recoil separator is often well suited or even needed to tell recoils and beam apart and to select the exit channel or to do spectroscopic studies.

Two different types of spectrometer designs are being considered for HIE-ISOLDE, namely a recoil mass separator or a ray-tracing type of spectrometer. A set of nuclear transfer reactions in inverse kinematics have been simulated using realistic parameters for HIE-ISOLDE. The performance of the two types of spectrometer designs is compared and their scientific possibilities and limitations discussed based on the simulation results. To evaluate the validity of the simulations a data set from PRISMA at LNL is also compared with simulation results and a comparison between simulations and these data will be presented.

HK 67.90 Th 14:00 Audi-Max

Die Ausleseelektronik des PANDA GEM-TPC Prototypen — •Matthias Danner, Igor Konorov, Laura Fabbietti und Alexander Schmah — Technische Universität München

Das Proton-Antiproton Experiment PANDA wird an der zukünftigen Beschleunigeranlage FAIR in Darmstadt im Hochenergie Speicherring (HESR) installiert. Als zentraler Spurverfolgungsdetektor ist, konkurrierend zueinander, entweder eine GEM-TPC oder ein straw tube Array vorgesehen. Um die hohen Anforderungen an den Detektor und die Ausleseelektronik zu testen, ist ein Prototyp der GEM-TPC geplant. Es ist u.a. vorgesehen, diesen Prototyp im FOPI-Spektrometer an der GSI einem Langzeittest zu unterziehen.
Für die Front-End-Auslese stehen alternativ zwei ASICs zur Verfügung: Der selbstgetriggerte n-XYTER [1] und der extern getriggerte APV Nachfolger T2K. Letzterer wird Mitte Dezember 2008 in einem ersten Strahltest am ELSA Beschleuniger in Bonn die Auslese des neuen GEM-TPC Prototypen gewährleisten. Die beiden Varianten der Ausleseelektronik als auch erste Ergebnisse der Teststrahlzeit werden vorgestellt. Diese Arbeit wird durch die HGF sowie von Excellence Cluster Universe unterstützt.
[1] C. J. Schmidt et al., *The n-XYTER Reference Manual*

HK 67.91 Th 14:00 Audi-Max

Emittance Measurements at the Darmstadt Source of Polarized Electrons — •Christoph Ingenhaag, Roman Barday, Christian Eckardt, Joachim Enders, Alf Göök, Yuliya Poltoratska, and Markus Wagner — Institut für Kernphysik, Technische Universität Darmstadt, Germany

Emittance measurements for low-energy (100 keV) electron beams are presented. Data was acquired at the teststand of the source of polarized electrons which is being developed for future implementation at the superconducting Darmstadt electron linear accelerator S-DALINAC. Polarized electrons are produced by laser irradiation of a strained-superlattice GaAs cathode. The emittance was determined by measuring the beam profile as a function of the focusing strength of a solenoid for various operation modes (intensity, laser spot size, laser wavelength, pulsed vs. DC laser operation) of the electron source.

Supported by Deutsche Forschungsgemeinschaft through SFB 634.

HK 67.92 Th 14:00 Audi-Max

A DCS-Offline Communication Framework for the ALICE TRD — •Frederick Kramer for the ALICE-TRD-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt, Germany

The transition radiation detector (TRD) of the CERN-LHC experiment ALICE is designed to provide excellent electron identification, tracking and a level-one trigger on different event signatures. To meet these requirements, the front-end electronics of the TRD performs complex data processing like online reconstruction, particle identification and a fast evaluation of trigger conditions. The detector control system (DCS) is used for operating and monitoring this electronics. For the purpose of data reconstruction and quality assurance the configuration, operation status and various run-specific counters of each TRD module are to be stored in the ALICE offline calibration database.

A procedure for the readout of the above data and for the communication between the systems involved has been implemented and is presented. Tools for online and offline data monitoring have been developed and are discussed as well.

HK 67.93 Th 14:00 Audi-Max

Energy dependence of pulse shapes in liquid scintillators* — •D. Savran[1], J. Glorius[1], B. Löher[1], M. Miklavec[2], N. Pietralla[1], V. Simon[1], K. Sonnabend[1], and M. Vencelj[2] — [1]Institut für Kernphysik, — [2]Institut Jožef Stefan,

In (γ, n) experiments, e.g. at the NEPTUN photon tagger system at the S-DALINAC, the neutron spectroscopy has to be realized in an enviroment of high photon background and therefore an effective discrimination between photons and neutrons is mandatory. Liquid scintillators like BC501A allow a separation of neutrons and photons based on a pulse shape analysis of the subsequent photomultiplier pulses. However, the quality of this separation is not constant, but varies with the incident neutron energy. The energy dependence of the pulse shapes and the resulting separation is studied in detail using digital pulse shape analysis. First results will be presented.

* Supported by DFG (SFB 634)

HK 67.94 Th 14:00 Audi-Max

The Upgrade of the Multiwire Drift Chamber Readout of the HADES Experiment at GSI: the Optical End Point Board. — •Attilio Tarantola[1,2], Ingo Froehlich[1], Burkhard Kolb[2], Jan Michel[1,2], Christian Muentz[1,2], Marek Palka[4,2], Herbert Stroebele[1], Joachim Stroth[1,2], Michael Traxler[2], and Joern Wuestenfeld[3] for the HADES-Collaboration — [1]Institut für Kernphysik, Goethe-Universität, Frankfurt, Germany — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — [3]Institut für Strahlenphysik, Forschungszentrum, Dresden-Rossendorf, Germany — [4]Smoluchowski Institut of Physics, Jagiellonian University, Krakow, Poland

One of the goal of the HADES upgrade project is the realization of a new data acquisition scheme for the 24 Multiwire Drift Chambers (MDCs), which allows to increase the readout speed of the 40.000 TDC channels. On the existing MDC Front End Electronic (FEE) side an Optical End Point Board (OEPB) has been designed to control configuration and readout of the chamber's TDCs. The OEPB uses Plastic Optical Fibres (POF) for data transmission, which results in total electromagnetic immunity, amazing simplicity in handling and low power consumption. The employment of a Lattice ECP2/M FPGA with SERDES manages serial data transmission and its large resources allow for the storage of several events close-to-front-end. As 400 OEPBs will be located in the detector acceptance, dedicated FPGA hardware is used to detect Single Event Upsets (SEUs).

HK 67.95 Th 14:00 Audi-Max

Umsetzung eines MAPS Demonstrators — •Christoph Schrader[1], Samir Amar-Youcef[1], Michael Deveaux[1], Ingo Fröhlich[1], Johann Heuser[2], Christian Müntz[1], Jan Michel[1], Selim Seddiki[1], Joachim Stroth[1], Tobias Tischler[1], Christian Trageser[1] und Bernhard Wiedemann[1] — [1]IKF, Goethe Universität Frankfurt — [2]GSI, Darmstadt

Die Identifikation von D-Mesonen in Schwerionenreaktionen mittels der Rekonstruktion ihres sekundären Zerfallsvertex erfolgt beim CBM Experiment (SIS300/FAIR) mit Hilfe des Mikro-Vertex-Detektors (MVD). Für diese Aufgabe muss er über eine einzigartige Kombination in Bezug auf hohe Strahlenhärte, Zeit- und Ortsauflösung und einem besonders geringen Materialbudget der Detektorstationen verfügen. Am Technologielabor des IKF wird ein Demonstrationsaufbau dieses auf MAPS-Sensoren (IPHC, Strassburg) basierenden Detektorsystems entwickelt, mit dem grundlegende Eigenschaften der elektronischen und mechanischen Integration erprobt werden sollen. Dieser umfasst speziell für MAPS Sensoren entwickelte Auslesekarten, die leistungsfähige Software und Hardware zur Verarbeitung der Daten der Sensoren in Echtzeit enthalten. Darüber hinaus wurden spezielle Trägerstrukturen für die MAPS-Chips konzipiert, die bei minimalem Materialbudget eine Kühlung der Sensoren in Vakuum sicherstellen

sollen. Das Konzept des Demonstrationsaufbaus und der Status der einzelnen Komponenten wird vorgestellt. *gefördert durch das BMBF (06FY173I), die GSI und Helmholtz Research School (Frankfurt)

HK 67.96 Th 14:00 Audi-Max

A new Testing Scheme for DCS- and Readout-Electronics of the ALICE Transition Radiation Detector — •Philipp Lüttig for the ALICE-TRD-Collaboration — Institut für Kernphysik Frankfurt

With the start of the LHC at CERN, one of the four main experiments, ALICE, starts its operation. ALICE is built for exploring the properties of hot and dense matter formed in heavy-ion-collisions, and especially for studying a possible transition to the quark-gluon-plasma (QGP). The ALICE Transition Radiation Detector (TRD) can separate electrons and pions with high precision, and can track the emitted particles after a collision. The TRD consists of 18 supermodules with 30 read-out chambers in each supermodule. The supermodules are arranged radially around the beam axis. At the Institut für Kernphysik Frankfurt the read-out chambers are equipped with Front-end electronics and cooling units, followed by a detailed testing procedure.
In this talk we discuss the test infrastructure and the different hardware and software components implemented in the testing process. Based on a modified data format, optimized for the testing, the noise characteristics in different test configurations are reviewed. New Graphical User Interfaces customized for process visualization and the analysis of test data will be presented.

HK 67.97 Th 14:00 Audi-Max

Reliable On-line Storage in the ALICE High-Level Trigger — •Sebastian Kalcher and Volker Lindenstruth for the ALICE-HLT-Collaboration — Kirchhoff Institute of Physics, University of Heidelberg, Germany

The on-line disk capacity within large computing clusters such as used in the ALICE High-Level Trigger (HLT) is often not used due to the inherent unreliability of the involved disks. With currently available hard drive capacities the total on-line capacity can be significant when compared to the storage requirements of present high energy physics experiments. In this talk we report on ClusterRAID, a reliable, distributed mass storage system, which allows to harness the (often unused) disk capacities of large cluster installations. The key paradigm of this system is to transform the local hard drive into a reliable device. It provides adjustable fault-tolerance by utilizing sophisticated error-correcting codes. To reduce the costs of coding and decoding operations the use of modern graphics processing units as co-processor has been investigated. Also, the utilization of low overhead, high performance communication networks has been examined. A prototype set up of the system exists within the HLT with 90 TB gross capacity.

HK 67.98 Th 14:00 Audi-Max

Development of a versatile digital readout system — •Marius C. Mertens, James Ritman, and Tobias Stockmanns for the PANDA-Collaboration — Forschungszentrum Jülich GmbH, Institut für Kernphysik, Jülich

During the research and design phase of new detector electronics, development of a suitable test environment takes a significant amount of time. Most existing systems are specifically designed for certain frontend electronics and cannot be reused for future developments. Thus, our approach is to build a flexible test environment with state-of-the-art hardware, which can be reconfigured to support various frontend electronics. This is achieved by deploying a modular design concept, which is followed in both hardware and software. Key features of the hardware platform are the gigabit optical connection to the PC, the powerful FPGA (Virtex 4), and consequent separation of analog and digital parts of the readout. Via firmware updates, arbitrary communication protocols can be implemented and the external connectors of the readout board can be freely configured. This is accompanied by a modular software framework written in C++ which declares different communication layers for easy hardware access as well as a generic storage structure for simple data handling. These levels of abstraction make it easy to add support for changed or completely new devices. The implementation of the digital readout system as well as its modular firmware and software design will be presented and its key features will be explained in detail. Supported in part by the EU and FZ-Jülich.

HK 67.99 Th 14:00 Audi-Max

Determination of the Gas Amplification in the ALICE Transition Radiation Detector — •Patrick Reichelt for the ALICE-TRD-Collaboration — Institut für Kernphysik Frankfurt

The Transition Radiation Detector (TRD) of the ALICE experiment at the LHC provides excellent electron/pion discrimination. The measurement principle is based on the recognition of high charge deposition mostly caused by the TR-signal produced by the electron. The initially produced charges are multiplied near the anode wires of the TRD-chamber. This gas amplification factor can be determined by using a γ-source of known power and comparing the calculated primary ionization to the measured anode-current. A systematic study of the gas gain will be presented.

Since the TRD will work at 1 mbar above atmospheric pressure, which is subject to continuous change, the pressure dependency of the gas gain has been studied. The effect of the differential pressure on chamber geometry and gas gain will be compared to design specifications in the Technical Design Report of the TRD.

HK 67.100 Th 14:00 Audi-Max

A drift chamber combined with a GEM stage for particle-identification and tracking studies — •Valeriy Serdyuk[1,2], Willi Erven[1], Pawel Kulessa[1,3], Henner Ohm[1], Krzysztof Pysz[1,3], and Peter Wüstner[1] — [1]FZ-Juelich — [2]JINR Dubna — [3]IFJ PAN, Krakow

Gaseous tracking detectors play a key role in existing and planned hadron and particle physics experiments. A universal tracking device has been set up for optimizing the performance of existing trackers (ANKE@COSY, WASA@COSY) and for developing new concepts (PANDA@FAIR). The setup consists of a drift gap followed by a GEM amplification stage and a stack of drift chambers. Additional scintillators above and below the setup give time reference signals for cosmics measurements. Data are read out with 160 MHz flash ADCs and with F1-TDCs. The setup will be described. Results on tracking resolution, cluster formation along cosmics tracks, gas amplification for various mixtures will be presented. The implication for particle identification based on the energy loss for e.g. straw detectors will be discussed.

Supported by FFE of FZ-Juelich

HK 67.101 Th 14:00 Audi-Max

A FPGA tracking algorithm for PANDA — •David Münchow for the PANDA-Collaboration — II. Physikalisches Institut, Heinrich-Buff-Ring 14, 35392 Gießen, Germany

The PANDA experiment at the future FAIR facility at GSI, Darmstadt, will investigate proton-antiproton collisions. The central detector might contain a straw tube tracker (STT) consisting of 15 double layers of straws. A tracking algorithm for the STT is being developed and will operate in several steps to (a) guarantee a good momentum resolution and (b) find tracks of an secondary vertex. Perpendicular to the beam direction the algorithm is using a conformal space transformation from circular tracks to straight lines. In order to find the tracks a Hough transformation and peak search are used. The algorithm will be implemented on an FPGA and be used as a trigger.

This poster was supported by BMBF and GSI
grant-no.:06 GI 180

HK 67.102 Th 14:00 Audi-Max

Design and setup of a trigger system for Moeller polarimetry to determine the electron beam polarisation at MAMI-C — •Peter-Bernd Otte — Institut für Kernphysik, Mainz, Germany

The "Crystal Ball (CB) Collaboration" at the "Institut fuer Kernphysik" in Mainz carries out experiments with real photons, which are produced via the Bremsstrahlung process from accelerated electrons coming from the accelerator MAMI (Mainz Microtron). In 2007 the new accelerator stage MAMI-C became operational and delivers up to 1.558 GeV in cw-mode. The energy-tagged photons induce reactions in nucleons and nuclei which are studied using the CB/TAPS 4π-calorimeter.

The helicity dependence of Moeller scattering can be used to measure the beam polarisation. To select these events in the tagging spectrometer, a specially adapted trigger system was developed. In the poster, the setup, experimental method and details of the FPGA-based trigger electronics will be presented.

HK 67.103 Th 14:00 Audi-Max

A position-sensitive gaseous detector for studies of laser-induced particle acceleration — •Qi Zhang[1,2], Markus Büscher[1], Istvan Császár[1,3], Md. Mosaddek Hossain[1,4], Ralph Jung[1,5], Pawel Kulessa[1,6], Henner Ohm[1], Gilbert Oswald[1,3], Va-

leriy Serdyuk[1,7], and Oswald Willi[1,5] — [1]FZ-Jülich — [2]RWTH Aachen — [3]FH Merseburg — [4]FH Aachen-Jülich — [5]U Düsseldorf — [6]IFJ PAN, Krakow — [7]JINR Dubna

The interaction of terawatt laser pulses with suitable gas or foil targets can yield bunches with up to 10^12 particles (e.g. protons) in the MeV region. For studies of these processes a position sensitive detector has been developed which is capable of detecting single charged particles as well as extremely intense bunches. The detector consists of an ionization chamber with a position-sensitive pad anode-plane and an additional proportional-chamber stage with a multi-wire anode plane. A Camac-based DAQ system is under preparation. First data taken using a laser-induced plasma as a particle source at the Institute for Laser and Plasma Physics at the University of Düsseldorf, are presented and discussed.

Supported by FFE of FZ-Jülich

HK 67.104 Th 14:00 Audi-Max

High Flux Experimental Setup for (γ, γ') and photoactivation experiments — •Simela Aslanidou, Matthias Fritzsche, Norbert Pietralla, Deniz Sarvan, and Kerstin Sonnabend — Institut für Kernphysik, Technische Universität Darmstadt

Performing NRF experiments is an established way to explore and prove basic nuclear properties. The standard method [1] uses a continuous-energy photon spectrum produced by bremsstrahlung.

In order to perform NRF and photoactivation experiments in the region above 10 MeV a new experimental setup is to be constructed at the superconducting linear accelerator S-DALINAC in Darmstadt. The construction focussed on a high photon flux combined with a low neutron background. Therefore, a thick multi-layer aluminum target was implemented such that the incoming electrons are completely stopped. The neutron background is kept low due to the high neutron separation threshold of aluminum of 13.1 MeV.

In order to monitor fluctuations in the energy of the incoming electron beam, the method of the partial charge deposition in the radiator layers is adopted [2].

[1] U. Kneissl, N. Pietralla, A. Zilges *J.Phys. G 32 (2006) R217-R252*
[2] Matthias Fritzsche, *Diploma Thesis, TU-Darmstadt* (2007)

HK 67.105 Th 14:00 Audi-Max

New Trigger-Algorithms for the HADES-DAQ-Upgrade — •Johannes Roskoss, Andreas Kopp, Ming Liu, and Wolfgang Kühn for the HADES-Collaboration — II. Physikalisches Institut, JLU Giessen, Heinrich-Buff-Ring 16, 35392 Gießen

For the upgrade of the HADES experiment, high data rates and sophisticated real time processing are foreseen. Thus, general purpose Compute Nodes based on FPGAs and modern network technologies have been designed. With these one is able to implement faster and more efficient algorithms for di-electron recognition designed in VHDL for the HADES META, MDC and RICH detectors.

In this contribution we focus on trigger algorithms for the sectorwise subevents from RICH, MDC, Shower and TOF. For the selection of electrons two new trigger algorithms are being implemented into the Compute Nodes: *(a)* a matching algorithm with the Shower and the TOF detectors and *(b)* a modified ring finder for the RICH detector. Results of the software simulation of the trigger algorithm and the status of the hardware implementation will be reported.

This work was supported in part by BMBF 06 GI 179 and GSI GIKÜH.

HK 67.106 Th 14:00 Audi-Max

A Start Detector for the new CBELSA/TAPS TPC — •Tim Odenthal for the CBELSA/TAPS-Collaboration — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, Nußallee 14-16, 53115 Bonn

As one of the upgrades to the Crystal-Barrel-Experiment at the electron accelerator ELSA (Bonn), a new inner tracking detector will be built. The present setup with its two electromagnetic calorimeters consisting of 1320 CsI(Tl) and 216 BaF_2 crystals respectively, is very well suited to measure photons. The inner scintillating fibre detector presently used for charged particle identification will be replaced by a **T**ime **P**rojection **C**hamber. To provide a time reference for the TPC, a start detector is under development. Due to the very limited space of only a few mm between the TPC and the polarised target, different design concepts for the start detector and its readout are under consideration. The poster will show the latest test results obtained. Plastic scintillating bars and fibres being read out by photomultipliers and SiPM are presently tested. This work is supported by the DFG (SFB/TR16).

HK 67.107 Th 14:00 Audi-Max

Simplified Radio Frequency Quadrupoles with a Linear Axial Field Based on Highly Resistive Electrodes — •Arno Becker[1], Timo Dickel[1], Hans Geissel[1,2], Martin Petrik[1], Wolfgang R. Plass[1,2], Christoph Scheidenberger[1,2], and André Simon[1] — [1]II. Physikalisches Institut, Justus-Liebig-Universität Gießen, Germany — [2]GSI, Darmstadt, Germany

Radio Frequency Quadrupoles (RFQs) are used in different fields of science. In nuclear physics, RFQs are employed for highly efficient transport, storage and cooling of exotic nuclei for precision experiments. In addition to the quadrupole field, which confines the ions in the radial direction, an axial field is required for the ion transport in a buffer gas filled environment.

Generating this axial field is a technical challenge. A novel and convenient method for the creation of an axial field is based on four highly resistive plastic rods. In addition to the RF voltage for the confining quadrupole field, different DC potentials are applied to the two ends of each rod. The voltage drop along the electrodes generates a linear axial field.

This method allows for a simplified construction and a reduced number of power supplies and electrical connections. Applications include cooler quadrupoles, curved RFQs as ion guides or for beam distribution, and diagnosis modules that alternatively transmit or identify ions. The design and experimental results of such RFQ systems will be presented.

HK 67.108 Th 14:00 Audi-Max

Design, Construction and Commissioning of an RF Trap System for a Multiple-Reflection Time-of-Flight Isobar Separator and Mass Spectrometer — •Christian Jesch[1], Timo Dickel[1], Wolfgang R. Plass[1,2], Arno Becker[1], Ulrich Czok[1], Hans Geissel[1,2], Martin Petrick[1], and Christoph Scheidenberger[1,2] — [1]Justus-Liebig-Universität Gießen — [2]GSI, Darmstadt

A multiple-reflection time-of-flight isobar separator and mass spectrometer (MR-TOF-MS) has been developed, which can be used for isobar separation, broadband mass spectrometry and high-accuracy mass measurement of very short lived nuclei with half-lives on the order of milliseconds. The start of the time-of-flight measurement in the MR-TOF-MS is given by the injection of ions from an RF trap. The performance of the mass spectrometer is significantly determined by the characteristics of the injected ion population.

The newly developed injection trap system provides cooled ion bunches of low emittance. It consists of three stages for fast ion cooling, while avoiding collisional losses during ion ejection. A fast-switching square wave RF source was developed. It allows to switch off the RF during ejection in order to reduce mass selective ion energies. The system was set up and commisioned. Time-of-flight peak widths of < 5 ns have been measured, enabling a mass resolving power of the MR-TOF-MS of 10^5 after a flight time of 1 ms. Cooling times of down to 1 ms and a high transmission efficiency have been achieved. The design of the trap system and first experimental results will be presented.

HK 67.109 Th 14:00 Audi-Max

New tracking detectors in the LAND/R^{3}B setup at GSI — •Ralf Plag for the R3B-Collaboration — GSI, Darmstadt, Germany — Goethe Universität Frankfurt, Germany

The LAND/R^{3}B setup at GSI in Darmstadt is a powerful facility to perform Coulomb dissociation experiments. These kinematically complete measurements require the identification of all incoming and outgoing particles with an extensive set of detectors.

Recently, two proton drift chambers and several double-sided silicon microstrip detectors (DSSD) have been added to the setup enabling the simultaneous tracking of protons and residual fragments.

The well established data analysis framework 'land02' is currently being upgraded in order to determine charge, energy, and trajectory of particles traversing these detectors. The current status of the analysis algorithm will be presented.

This project is supported by the HGF Young Investigators Project VH-NG-327.

HK 67.110 Th 14:00 Audi-Max

Occupancy study of the Micro-Vertex Detector for the Compressed Baryonic Matter experiment * — Deveaux Michael[1], Fröhlich Ingo[1], Müntz Christian[1], •Seddiki Selim[1,2], Stroth

Joachim[1], and Trageser Christian[1] for the CBM-Collaboration — [1]IKF, Frankfurt, Germany — [2]IPHC, Strasbourg, France

The Compressed Baryonic Matter experiment (CBM) is aiming at the study of dense and hot hadronic matter by means of relativistic heavy ion collisions. One important subsystem of CBM is the Micro-Vertex Detector (MVD) which is intended for detecting open charmed particles by reconstructing their displaced decay vertex. The MVD is located close to the collision point. We expect therefore very high occupancies and data rates due to the high multiplicity environment of the heavy ion collisions.

In the work presented here we simulated the occupancy of the MVD. A focus was laid on the substantial amount of delta-electrons produced in the target of the experiment by the passage of beam particles. Their contribution to the detector occupancy has been investigated with GEANT3 and GCALOR for Au beam ions crossing the Au target material. Moreover, strategies to reduce the number of hits caused by those delta-electrons were evaluated. * supported by BMBF(06FY1731)

HK 67.111 Th 14:00 Audi-Max

Random Telegraph Signal in mit nicht-ionisierender Strahlung bestrahlten Monolithic Active Pixel Sensoren* — •Dennis Doering[1], Samir Amar-Youcef[1], Alex Büdenbender[1], Michael Deveaux[1], Ingo Fröhlich[1], Christian Müntz[1], Joachim Stroth[1] und Franz M. Wagner[2] — [1]IKF, Goethe Universität Frankfurt — [2]Forschungsneutronenquelle Heinz-Maier-Leibnitz (FRM II), Technische Universität München

Monolithic Active Pixel Sensoren (MAPS) sind hochgranulare Sensoren für die Messung geladener Teilchen. Aufgrund ihrer guten Ortsauflösung und ihres sehr geringen Materialbudgets sollen sie im Vertexdetektor verschiedener Experimente der Kern- und Teilchenphysik (CBM, STAR, ILC) zum Einsatz kommen. Um den in diesen Experimenten auftretenden Strahlendosen begegnen zu können, ist ein detailliertes Verständnis der Auswirkungen von Strahlenschäden in MAPS erforderlich. Hierbei ist auch das durch nicht-ionisierende Strahlung verursachte Random Telegraph Signal (RTS) der Pixel von Bedeutung, das bisher nur unzulänglich untersucht wurde. Dieses RTS manifestiert sich als Modulation des Dunkelsignals der Pixel zwischen mehreren wohldefinierten Niveaus, die als Teilchensignal fehlinterpretiert werden können. Im Rahmen der vorgestellten Arbeit wurde das RTS von MAPS systematisch als Funktion von Temperatur und nichtionisierender Strahlendosis untersucht. Die Messverfahren und die Ergebnisse bezüglich der Zahl der betroffenen Pixel und der Zahl der falschen Hitanzeigen werden vorgestellt. *gefördert durch das BMBF (06FY1731) und GSI.

HK 67.112 Th 14:00 Audi-Max

PandaGrid - a Tool for Physics — •Kilian Schwarz[1] and Dan Protopopescu[2] — [1]GSI, Planckstr. 1, D-64291 Darmstadt — [2]University of Glasgow, G12 8QQ, Scotland, UK

PandaGrid is based on the AliEn middleware and contains currently 18 sites on 3 continents. PandaGrid provides the physicist not only with computing resources but with a complete suite of tools and services, freeing the user from the overhead of software installation, configuration, data storage and job management. Consequently, the user can focus solely on the physics to be studied. This is made possible by the support structure within the PandaGrid, where, besides computing infrastructure, expert teams provide middleware and experiment-specific software support, monitoring, rapid prototyping and fast problem solving.