HK 56: Poster - Struktur und Dynamik von Kernen

Zeit: Mittwoch 16:45–16:45 Raum: HSZ 4.OG

HK 56.1 Mi 16:45 HSZ 4.OG

Neue Formen der Darstellung des Elektrons und Protons mit Plancks Definition des Griechischen Atombegriffs — •Erhard Schulz — Wiesenstraße 32, 01987 Schwarzheide

Wenn E als unbeschränkt teilbare Größe angesehen wird, ist die Verteilung auf unendlich viele Arten möglich. Wir betrachten aber - und dies ist der wesentliche Punkt der ganzen Betrachtung - E als zusammengesetzt aus einer ganz bestimmten Anzahl endlich gleicher Teile .. [Zitat aus Annalen der Physik1901, p. 553 bis 563 von Planck]. Diese endlich gleiche Teile (Quanten) sind identisch mit den Griechischen Atomen. Diese Quanten bewegen sich mit konstanten Geschwindigkeiten und beschreiben unteilbare physikalische Zustände. Diese elementare Energie existiert in zwei Formen als reines Photon (Impulsform) und reines Roton (Spinform). Wechselwirkungen bestehen aus der Absorption oder Emission von Quanten. Diese Wechselwirkungen werden experimentell als Kräfte, Zeit, Gravitation, elektromagnetische Felder und andere physikalische Größen wahrgenommen. Das Elektron und das Proton wird mit diesen elementaren Energieformen beschrieben. Siehe: http://gisela43ch.wordpress.com.

HK 56.2 Mi 16:45 HSZ 4.OG

Study of the γ-decay behavior of $(2^+ \otimes 3^-)_{1^-}$ candidates with the γ^3 setup at HIγS — •Anne Sauerwein[1], Vera Derya[1], Janis Endres[1], Andreas Hennig[1], Bastian Löher[2,3], Deniz Savran[2,3], Werner Tornow[4], and Andreas Zilges[1] — [1]Institut für Kernphysik, Universität zu Köln — [2]ExtreMe Matter Institute EMMI and Research Division, GSI — [3]Frankfurt Institute for Advanced Studies — [4]Department of Physics, Duke University, USA

Vibrational excitations in atomic nuclei can be described within the scope of the harmonic phonon-model. The coupling of a quadrupole phonon with an octupole phonon leads to a quintuplet of negative-parity states, including the two-phonon $J^\pi = 1^-$ state. A direct test of the two-phonon character is the study of the γ decay into constituent one-phonon excitations, and the comparison of their reduced transition strengths to model predictions. The high-efficiency γ^3 setup at the High Intensity γ-ray Source facility was used, in order to investigate the γ-decay behavior of $(2^+ \otimes 3^-)_{1^-}$ candidates in ^{40}Ca and ^{140}Ce. A detector-array consisting of four High-Purity Germanium detectors, four 3" LaBr detectors and three 1.5" LaBr detectors was used for γ-ray detection. The data acquisition is capable of storing γ-γ coincidence events as well as singles events, allowing for the determination of γ-decay branching ratios.

Supported by the DFG (ZI 510/4-2) and the Alliance Program of the Helmholtz Association (HA216/EMMI). A.S., V.D., and A.H. are members of the Bonn-Cologne Graduate School of Physics and Astronomy.

HK 56.3 Mi 16:45 HSZ 4.OG

Precision mass measurements with the mass spectrometer ISOLTRAP — •Dinko Atanasov for the ISOLTRAP-Collaboration — Max-Planck-Institut für Kernphysik, Heidelberg, Germany, — IMPRS-PTFS, Heidelberg, Germany.

The precision of nuclear masses has been greatly improved after introducing Penning traps as a tool for direct mass measurements. With the mass spectrometer ISOLTRAP relative mass uncertainties of $1 \cdot 10^{-8}$ or better are routinely reached. The present setup consists of a combination of four traps: a radio frequency Paul trap (used to cool and bunch the beam), a multi-reflection time-of-flight mass separator or MR-TOF MS for short (used to purify the beam), a preparation Penning trap (for further preparation and purification), and a precision Penning trap (for the mass measurement). Presently, the ISOLTRAP setup offers several techniques to determine the masses of singly charged ions. For example, the time-of-flight method employed at the MR-TOF or the time-of-flight ion cyclotron resonance (TOF-ICR) technique using the precision Penning trap. Measurements with the MR-TOF MS still offer a relative uncertainty on the order of 10^{-7}.

The ISOLTRAP experiment itself is located at the isotope separator on-line facility (ISOLDE) at CERN, where a broad mass range of stable and short-lived exotic species can be investigated. Recent mass measurements on neutron-rich Zn and Cs isotopes will be presented. Furthermore, their impact on nuclear structure and astrophysics will be discussed.

HK 56.4 Mi 16:45 HSZ 4.OG

Neutron-capture experiment on ^{78}Se with EXOGAM at ILL Grenoble — •Robert John[1], Ralph Massarczyk[1], Ronald Schwengner[1], Aurelien Blanc[2], Michael Jentschel[2], Ulli Köster[2], Paolo Mutti[2], Waldemar Urban[2], Tamas Belgya[3], and Stanislav Valenta[4] — [1]Helmholtz Zentrum Dresden Rossendorf — [2]ILL Grenoble — [3]IKI Budapest — [4]Charles University Prague

We present first results of a neutron-capture study of ^{78}Se. The experiment was carried out with cold neutrons at the reactor of the Institut Laue-Langevin (ILL) at Grenoble. Gamma rays following the ^{77}Se(n,γ) reaction were measured with eight EXOGAM clover detectors, one clover detector taken from the Lohengrin setup and six GASP detectors. This setup enabled the measurement of two- and three-fold γ-ray coincidences as well as of angular correlations of the γ rays with high efficiency. The aim of the analysis is to gain detailed information about the deexcitation patterns of the capture state and lower-lying excited states. These may be used as a test for statistical simulations of γ-ray cascades and their inputs, such as γ-ray strength functions and level densities. This work was supported by the BMBF Joint Research Project TRAKULA.

HK 56.5 Mi 16:45 HSZ 4.OG

Precision mass measurements of exotic calcium isotopes using ISOLTRAP's multi-reflection time-of-flight mass spectrometer — •Frank Wienholtz for the IS532-Collaboration — Ernst-Moritz-Arndt-Universität, Institut für Physik, 17487 Greifswald, Germany

State-of-the-art precision measurements on radioactive ions have been performed with the Penning-trap mass spectrometer ISOLTRAP at CERN. Minute production rates often accompanied by huge isobaric background and millisecond half-lives pose enormous challenges on the experimental setup and often require new experimental techniques. The ISOLTRAP setup has recently been enhanced with an electrostatic mirror ion trap acting as a multi-reflection time-of-flight mass separator (MR-ToF MS) for beam purification. It can likewise be used as a spectrometer in combination with a suitable detector increasing the mass-measurement capability of ISOLTRAP considerably. The measurements on the calcium isotopic chain will be presented together with the nuclear structure they reveal. The measurements up to ^{54}Ca are compared with predictions from models that utilize three-body nuclear forces.

HK 56.6 Mi 16:45 HSZ 4.OG

Aktuelle Ergebnisse zur photoinduzierten Spaltung am S-DALINAC — •Martin Freudenberger[1], Alf Göök[1,2], Christian Eckardt[1], Joachim Enders[1], Peter von Neumann-Cosel[1], Andreas Oberstedt[3,4] und Stephan Oberstedt[2] — [1]Institut für Kernphysik, TU Darmstadt — [2]European Commission, DG Joint Research Centre (IRMM), Geel, Belgien — [3]Akademin för Naturvetenskap och Teknik, Örebro Universitet, Schweden — [4]CEA-DAM Ile de France, Bruyères-le-Châtel, Frankreich

Die Massen- und Winkelverteilung sowie die totale kinetische Energie (TKE) der Spaltfragmente in der Spaltung leichter Aktinide wurde am Darmstädter supraleitenden Elektronenbeschleuniger S-DALINAC mit Hilfe von Bremsstrahlungsphotonen bei Energien knappp oberhalb der Spaltbarriere untersucht. Die Spaltmodengewichte von ^{234,238}U und ^{232}Th, im Rahmen des Multi-Modal Random Neck-Rupture Modells [1] und eine Korrelation zwischen Winkel- und Massenverteilung sowie TKE der Spaltfragmente werden vorgestellt [2].

Diese Arbeit wurde in Teilen unterstützt durch den SFB 634 der DFG, dem Kooperationsvertrag zwischen der TU Darmstadt und der GSI sowie dem LOEWE Zentrum HIC for FAIR des Landes Hessen.

[1] U. Brosa, S. Grossman, A. Müller, Phys. Rep. 197 (1990) 167.
[2] A. Göök, Dissertation, D17, TU Darmstadt (2012).

HK 56.7 Mi 16:45 HSZ 4.OG

High-resolution proton scattering off ^{70}Zn under extreme forward angles* — •Andreas Ebert[1], Dirk Martin[1], Peter von Neumann-Cosel[1], Norbert Pietralla[1], and Atsushi Tamii[2] for the E377-Collaboration — [1]Institut für Kernphysik, TU Darmstadt — [2]Research Center for Nuclear Physics, Osaka, Japan

A high-resolution scattering experiment was performed with a 295 MeV proton beam at the Research Center of Nuclear Physics in Osaka, Japan. The nucleus ^{70}Zn has been measured under scattering angles of 0°, 3° and 4.5°. From the angular distributions it is possible to distinguish spin-M1 and E1 response [1]. The spin-M1 response is assumed to be affected by the shell evolution due to the tensor force towards the exotic neutron-rich doubly magic nuclei ^{78}Ni [2]. The experiments will also provide important information on the evolution of the pygmy dipole resonance with neutron excess by comparison with unstable neutron-rich isotones ^{68}Ni discovered recently at GSI [3].

During the analysis procedure, ion optical correction methods, drift time to distance conversion, high-resolution corrections and an energy calibration are applied. After the background subtraction, double differential cross sections can be extracted. And the cross sections will decomposed into M1-response and E1-response.

[1] A. Tamii et. al. Phys. Rev. Lett. 107,062502 (2011).
[2] T. Otsuka Phys. Rev. Lett. 104 (2010) 012501.
[3] O. Wieland et. al. Phys. Rev. Lett. 102 (2009) 092502.

*Supported by DFG through SFB 634 and NE 679/3-1.