HK 63: Structure and Dynamics of Nuclei 12

Time: Thursday 17:00–18:45 Location: P/H2

Group Report HK 63.1 Thu 17:00 P/H2

Decay properties of the Pygmy Dipole Resonance — •J. Isaak[1,2], T. Aumann[3,4], T. Beck[3], N. Cooper[5], V. Derya[6], U. Gayer[3], J. Kelley[7,8], B. Löher[3,4], N. Pietralla[3], C. Romig[3], D. Savran[1,2], M. Scheck[9,10], H. Scheit[3], J. Silva[1,2], W. Tornow[7], H. Weller[7], V. Werner[3], A. Zilges[6], and M. Zweidinger[3] — [1]EMMI, Darmstadt — [2]FIAS, Frankfurt — [3]IKP, TU Darmstadt — [4]GSI, Darmstadt — [5]WNSL, Yale University, New Haven, USA — [6]IKP, Universität zu Köln — [7]Department of Physics, Duke University, TUNL, USA — [8]Department of Physics, NCSU, USA — [9]School of Engineering, UWS, Paisley, UK — [10]SUPA, Glasgow, UK

The so-called Pygmy Dipole Resonance (PDR) has been investigated in stable and in a few unstable nuclei in the past decades. So far, decay properties have been determined only in an indirect or model-dependent way. An excellent tool to extend the study of the decay pattern of the PDR is provided by the γ^3-setup [1] at the High Intensity γ-ray Source (HIγS). The combination of the γ-γ-coincidence method and the quasi-monochromatic photon beam at HIγS allows to observe primary transitions directly with high sensitivity and to obtain information on the decay behavior of individual states as well as extracting averaged quantities in a model-independent way. Recent experimental results for nuclei in the Z=50 and N=82 mass region will be presented.

[1] B. Löher *et al.,* NIM A 723 (2013) 136.

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HK 63.2 Thu 17:30 P/H2

Selective excitation of the Pygmy Dipole Resonance in ^{120}Sn via the (d,pγ)-reaction — •Michael Weinert, Vera Derya, Andreas Hennig, Simon G. Pickstone, Mark Spieker, Julius Wilhelmy, and Andreas Zilges — Institute for Nuclear Physics, University of Cologne

The excitation of states belonging to the Pygmy Dipole Resonance (PDR) by a single-neutron transfer-reaction was investigated in ^{120}Sn, using a ^{119}Sn(d,pγ)-experiment and the combined setup SONIC@HORUS at the 10 MV Tandem accelerator in Cologne. The setup consisting of 14 HPGe and 6 ΔE-E silicon telescope detectors for the coincident detection of γ-rays and charged particles, respectively, enables an offline selection of excitation and deexcitation channels. First results show that dipole states in the PDR region, i.e. 5 MeV to 9 MeV, could be excited by the reaction. These dipole states were identified as PDR states by comparison with data from a Nuclear Resonance Fluorescence experiment [1]. The contribution will present the experiment and principles of the data analysis needed to select transitions from or to $J^\pi = 1^-$ states. Using results from the experiment, features of the PDR will be discussed, including possible particle-hole configurations. Supported by the DFG (ZI 510/4-2).

[1] B. Özel *et al.*, Phys. Rev. C **90** (2014) 024304

HK 63.3 Thu 17:45 P/H2

Pygmy-Resonanz im schweren deformierten Kern ^{154}Sm aus polarisierter Protonenstreuung unter 0°.* — •Andreas Krugmann[1], Sergej Bassauer[1], Michaela Hilcker[1], Dirk Martin[1], Peter von Neumann-Cosel[1], Norbert Pietralla[1], Vladimir Ponomarev[1] und Atsushi Tamii[2] für die EPPS0-Kollaboration — [1]Insitut für Kernphysik, TU Darmstadt — [2]Research Center for Nuclear Research, Osaka University

Am RCNP in Osaka wurde ein Protonenstreuexperiment mit polarisierten Protonen am deformierten Kern ^{154}Sm unter extremen Vorwärtswinkeln inklusive 0° durchgeführt. Mittels der Methode der Polarisationstransferobservablen konnte eine Trennung des Spinflipanteils und des Nicht-Spinflipanteils am gesamten Wirkungsquerschnitt vorgenommen werden. Im Falle der elektrischen Dipolstärke konnte zum ersten Mal die Pygmy Dipolresonanz in einem schweren deformierten Kern identifiziert werden. Eine Doppelstruktur mit Maxima bei 6 und 8 MeV wurde beobachtet. Als mögliche Interpretation wird eine Deformationsaufspaltung aufgrund der Erhaltung der K-Quantenzahl analog zur Dipolriesenresonanz gegeben. Für die magnetische Dipolstärke wurde eine breite Verteilung im Anregungsenergiebereich zwischen 6 und 12 MeV in relativ guter Übereinstimmung mit früheren Experimenten [1] gefunden.

[1] K. Heyde, P. von Neumann-Cosel and A. Richter, Rev. Mod. Phys. **82**, 2365 (2010).

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

HK 63.4 Thu 18:00 P/H2

Decay behaviour of 1^- states in ^{92,94}Mo observed with SONIC@HORUS — •Simon G. Pickstone, Vera Derya, Andreas Hennig, Mark Spieker, Michael Weinert, Julius Wilhelmy, and Andreas Zilges — Institute for Nuclear Physics, University of Cologne

In the last decade, the Pygmy Dipole Resonance (PDR) has attracted a lot of interest both in experimental and theoretical nuclear physics. However, some key observables are still not easily accessible. One of these is the decay branching of the PDR to excited states, which is a sensitive measure of the wave functions. To gain access to this observable, the new setup SONIC@HORUS consisting of silicon and HPGe detectors at the Institute for Nuclear Physics in Cologne was used to investigate the two molybdenum isotopes ^{92}Mo and ^{94}Mo in inelastic proton scattering experiments. In these experiments, both the energy of the γ-ray and of the particle were measured in coincidence with high energy resolution and in the offline analysis, specific excitation and de-excitation patterns were studied.

The results of the ^{92}Mo(p,p'γ) experiment will be presented, giving insight into the state-to-state decay behaviour of the PDR. Additionally, preliminary results of the ^{94}Mo(p,p'γ) experiment will be shown, focussing on the same observable for this non-magic nucleus. Supported by the DFG (ZI 510/4-2).

HK 63.5 Thu 18:15 P/H2

Zerfallsverhalten tiefliegender dipolangeregter Zustände der $Z = 40$ Isotope ^{92,94}Zr* — •Markus Zweidinger[1], Tobias Beck[1], Jacob Beller[1], Udo Gayer[1], Johann Isaak[2,3], Bastian Löher[1,4], Laura Mertes[1], Haridas Pai[1], Norbert Pietralla[1], Philipp Ries[1], Christopher Romig[1], Deniz Savran[2,3], Marcus Scheck[5,6], Werner Tornow[7] und Volker Werner[1] — [1]IKP, TU Darmstadt — [2]EMMI, GSI, Darmstadt — [3]FIAS, Frankfurt — [4]GSI, Darmstadt — [5]School of Engineering, UWS, Paisley, UK — [6]SUPA, Glasgow, UK — [7]Duke University, Durham, USA

Zur Untersuchung der Dipolstärkeverteilung wurden am Darmstadt High Intensity Photon Setup am S-DALINAC der TU Darmstadt Photonenstreuexperimente an den Kernen ^{92}Zr und ^{94}Zr durchgeführt. Mit Hilfe von unpolarisierter Bremsstrahlung wurden Spinquantenzahlen der angeregten Zustände und Übergangsstärken bis zur jeweiligen Neutronenseparationsenergie ermittelt. Zusätzlich wurden an beiden Kernen Messungen mit quasimonoenergetischen, polarisierten Photonen an der High Intensity γ-ray Source der Duke University, Durham, NC, USA, durchgeführt. Diese Messungen erlauben die Bestimmung von Paritätsquantenzahlen sowie die Untersuchung von Zerfällen in tieferliegende angeregte Zustände wie den 2_1^+ Zustand. Außerdem können für letztere mittlere Zerfallsverzweigungsverhältnisse gemessen werden. Die Ergebnisse beider Messkampagnen werden vorgestellt und diskutiert.

*Gefördert durch die DFG im Rahmen des SFB 634

HK 63.6 Thu 18:30 P/H2

The Dipole Response of ^{132}Sn — •Philipp Schrock[1], Thomas Aumann[1], Konstanze Boretzky[2], Jacob Johansen[1], Dominic Rossi[3], and Fabia Schindler[1] for the R3B-Collaboration — [1]IKP, TU Darmstadt — [2]GSI Helmholtzzentrum — [3]Michigan State University

The Isovector Giant Dipole Resonance (IVGDR) is a well-known collective excitation in which all protons oscillate against all neutrons of a nucleus. In neutron-rich nuclei an additional low-lying dipole excitation occurs, often denoted as Pygmy Dipole Resonance (PDR).

To study the PDR in exotic Sn-isotopes, an experiment has been successfully performed with the upgraded R^{3}B-LAND setup at GSI. The complete-kinematics measurement of all reaction participants allows for the reconstuction of the excitation energy and, hence, the extraction of the dipole strength. Presented are the main features of the experiment, the analysis concept and the current status of the analysis of the dipole response of the doubly-magic isotope ^{132}Sn.

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