

HK 57: Struktur und Dynamik von Kernen IX

Time: Thursday 16:30–18:30

Location: O-1

HK 57.1 Thu 16:30 O-1

Dipole strength in ^{86}Kr up to the neutron-separation energy — ●RALPH MASSARCZYK¹, RONALD SCHWENGER¹, ARND JUNGHANS¹, GENCHO RUSEV², GEORG SCHRAMM¹, and ANDREAS WAGNER¹ — ¹Forschungszentrum Dresden-Rossendorf, 01314 Dresden, Germany — ²Duke University and TUNL, Durham, NC 27708, USA

For the first time a high-pressure gas target has been investigated at the bremsstrahlung facility at the ELBE accelerator of the Forschungszentrum Dresden-Rossendorf. The experiment was carried out at an electron beam energy of 12 MeV in order to study the energy region up to the neutron separation. GEANT4 simulations were performed to subtract the atomic background from the measured spectrum and deduce the intensity of the resonantly scattered γ -rays. Considering also transitions from states in the quasicontinuum, simulations of γ -ray cascades were carried out with a new code to estimate branching ratios. As a result the photoabsorption cross section obtained from transitions to the ground state is calculated. The data will be presented in the context of further photon-scattering experiments performed in Rossendorf on the stable isotopes at the closed neutron shell $N = 50$.

HK 57.2 Thu 16:45 O-1

Lifetime and g-factor measurements of excited nuclear states in ^{86}Kr and unstable neutron-rich ^{90}Sr — ●PHILIPP JOHN¹, ANDREA JUNGCLAUS², JÖRG LESKE¹, RICCARDO ORLANDI², NORBERT PIETRALLA¹, MICHAEL REESE¹, CHRISTIAN STAHL¹, IVAN KOJOUHAROV³, HENNING SCHAFFNER³, and HANS-JÜRGEN WOLLERSHEIM³ — ¹IKP, TU Darmstadt, Germany — ²CSIC Madrid, Spain — ³GSI Darmstadt, Germany

The isotopes $^{88-96}\text{Sr}$ and $^{90-98}\text{Zr}$ form the region of lowest collectivity between ^{56}Ni and $^{204-210}\text{Pb}$ with a unique behaviour of their $B(E2)$ values. The nuclear structure of the lowest excited states is strongly influenced by neutron and proton subshell closures between $N = 50$ and $N = 82$ which tend to stabilize spherical configurations. The nucleus ^{90}Sr is also interesting for the investigation of states with mixed proton-neutron symmetry. In the campaign U246 at the UNILAC (GSI) lifetimes and g factors of excited nuclear states in ^{86}Kr and ^{90}Sr have been measured using the Transient Field technique and DSAM after population of the states in a Coulex (^{86}Kr) and α -transfer (^{90}Sr) reaction. Results will be presented and discussed within different nuclear models. *supported by BMBF

HK 57.3 Thu 17:00 O-1

Entwicklung von Deformationen in neutronenreichen Krypton Isotopen — ●MICHAEL ALBERS¹, NIGEL WARR¹, ANDREY BLAZHEV¹ und DENNIS MÜCHER² für die MINIBALL IS485-Kollaboration — ¹Institut für Kernphysik, Universität zu Köln — ²Physik-Department 12, TU München

In der $A \approx 100$ Massenregion ist bei $N=60$ in der Sr und Zr Isotopenkette ein Form-Phasenübergang von sphärischen zu deformierten Kernformen zu beobachten. Die Ausprägung des Übergangs variiert dabei mit der Protonenzahl der einzelnen Isotopenketten. Aufschluß über die Entwicklung der Kerndeformationen geben die Systematiken der Energien $E(2_1^+)$ und der Übergangsstärken $B(E2; 2_1^+ \rightarrow 0_1^+)$. In der Kr Isotopenkette sind beide Observablen bis $N=58$ bekannt, für $N=60$ wurden kürzlich widersprüchliche Ergebnisse zur Evolution dieser Observablen veröffentlicht [1,2]. Um diesen Widerspruch zu lösen, wurde ein Coulomb-Anregungsexperiment an ^{94}Kr und ^{96}Kr am REX-ISOLDE Beschleuniger des CERN durchgeführt. Als experimenteller Aufbau diente das MINIBALL γ -Spektrometer. Die Ergebnisse dieser Messung werden vorgestellt und diskutiert.

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- [1] N. Marginean et al., Phys. Rev. C80 (2009), 021301
[2] S. Naimi et al., Phys. Rev. Lett. 105 (2010), 032502

HK 57.4 Thu 17:15 O-1

First g-factor measurement on radioactive $^{88}\text{Zr}(2_1^+)$ near the $N=50$ shell closure* — ●K.-H. SPEIDEL¹, G.J. KUMBARTZKI², N. BENCZER-KOLLER², D.A. TORRES², G. GÜRDAL², Y.Y. SHARON², T. AHN³, V. ANAGNOSTATOU³, CH. BERNARDS³, M. ELVERS³, P.

GODDARD³, G. ILIE³, D. RADECK³, D. SAVRAN³, V. WERNER³, J. ASHENFELDER³, F. LOPEZ³, C. MILLER³, and P. MAIER-KOMOR⁴ — ¹Helmholtz-Institut für Strahlen- und Kernphysik, Uni Bonn — ²Rutgers University, New Brunswick NJ — ³Yale University, New Haven CT — ⁴Physik-Department, TU München

The Zr nuclei at and near shell closures in protons ($Z=40$) and neutrons ($N=50$) play a very important role for nuclear structure studies. For the radioactive ^{88}Zr the two neutron holes in the $g_{9/2}$ orbital should show a distinct fingerprint in the nuclear wave function of the 2_1^+ state which can be observed by its g-factor. The α -transfer from a carbon target to ^{84}Sr projectiles of 278 MeV has been used to populate the 2_1^+ state in ^{88}Zr via the reaction $^{12}\text{C}(^{84}\text{Sr}, ^8\text{Be})^{88}\text{Zr}$. The ^{84}Sr beam was provided by the Yale tandem accelerator using highly enriched ^{84}Sr in the form of SrH_3 ions emerging from the ion source. The two α -particles from the breakup of ^8Be and the recoiling carbon ions from projectile Coulomb excitation were detected in a Si detector at 0° in coincidence with γ -rays recorded in four Ge Clover detectors. Spin precessions have been measured simultaneously for ^{88}Zr and ^{84}Sr nuclei employing the transient field technique. The g-factors obtained for the 2_1^+ states are discussed in the context of similar data for neighbouring isotopes around the $N=50$ shell closure. *supported by the DFG

HK 57.5 Thu 17:30 O-1

New measurements of the g-factor and lifetime of the 2_1^+ state in ^{86}Sr using a Sr beam* — ●K.-H. SPEIDEL¹, G.J. KUMBARTZKI², N. BENCZER-KOLLER², D.A. TORRES², Y.Y. SHARON², T. AHN³, V. ANAGNOSTATOU³, CH. BERNARDS³, M. ELVERS³, P. GODDARD³, G. ILIE³, D. RADECK³, D. SAVRAN³, V. WERNER³, J. ASHENFELDER³, F. LOPEZ³, C. MILLER³, and P. MAIER-KOMOR⁴ — ¹Helmholtz-Institut für Strahlen- und Kernphysik, Uni Bonn — ²Rutgers University, New Brunswick NJ — ³Yale University, New Haven CT — ⁴Physik-Department, TU München

In view of the wide nuclear structure interest in nuclei near the $N=50$ shell closure we have remeasured the g-factor and the lifetime of the 2_1^+ state in ^{86}Sr employing projectile Coulomb excitation combined with the transient field technique. As ^{86}Sr is the isotone of ^{88}Zr but with two protons less one may expect very similar wave functions for the corresponding 2_1^+ states. This suggestion is well supported by an almost identical excitation pattern of low-lying states. The ^{86}Sr beam of 250 MeV was provided by the Yale tandem accelerator and Coulomb excited by a carbon layer deposited on thin layers of Gd and Cu. The γ rays emitted from ^{86}Sr have been measured with Ge Clover detectors in coincidence with the recoiling carbon ions which were detected in a Si detector at 0° . The g-factor and the lifetime of the 2_1^+ state were determined from spin precessions in the transient field and the Doppler-broadened lineshape of the $(2_1^+ \rightarrow 0_1^+)$ γ line, respectively. The results are compared with previous data and will be discussed in the context of new results for ^{88}Zr . *supported by the DFG

HK 57.6 Thu 17:45 O-1

Messung der $g(2_1^+)$ -Faktoren und Lebensdauern zur Strukturanalyse in $^{116,118,120,126}\text{Te}$ — ●TIMO BLOCH¹, J. LESKE¹, N. PIETRALLA¹, A. JUNGCLAUS², P. BOUTACHKOV³, P. DOORNENBAL⁴, A. EKSTRÖM⁵, J. GERL³, N. GOEL³, I. KOJOUHAROV³, P. MAIER-KOMOR⁶, V. MODAMIO², F. NAQVI³, S. PIETRI³, W. PROKOPOWICZ³, H. SCHAFFNER³, R. SCHWENGER⁷, K.-H. SPEIDEL⁸, J. WALKER² und H.-J. WOLLERSHEIM³ — ¹Institut für Kernphysik, TU Darmstadt — ²IEM, CSIC Madrid — ³GSI Darmstadt — ⁴RIKEN Nishina Center, Wako, Saitama — ⁵Department of Physics, Lund University — ⁶Physik Department E12, TU München — ⁷Institut für Strahlenphysik, FZ Dresden-Rossendorf — ⁸HISKP, Universität Bonn

Im Rahmen der Experimente U234/U236 am UNILAC der GSI Darmstadt wurden aus stabilen Sn-Projektilen mit Energien von 3.8-4.0 MeV/u durch α -Transfer-Reaktion an einer ^{12}C -Folie die Isotope $^{116,118,120,126}\text{Te}$ erzeugt und anschließend simultan zu den Coulombangeregten Sn-Isotopen mit der Methode der gestörten Teilchen- γ -Winkelkorrelation (PAC) mittels Transienter Felder (TF) auf ihre $g(2_1^+)$ -Faktoren untersucht. Das experimentelle Setup mit einem Mehrschichttarget erlaubte zudem die Bestimmung von Zustands-Lebensdauern mittels DSAM-Analyse der Doppler-verschobenen Linienformen. Die Ergebnisse in den radioaktiven Isotopen $^{116,118}\text{Te}$ lassen Rückschlüsse darauf zu, ob sich der Vibrationscharakter der geraden,

stabilen Te-Isotope (A=120-130) in den neutronenarmen Kernen fortgesetzt oder Einteilchen-Konfigurationen an Bedeutung gewinnen.

HK 57.7 Thu 18:00 O-1

Strong M1 components in $3_i^- \rightarrow 3_1^-$ in nearly spherical nuclei: Evidence for isovector-octupole excitations — ●MARCUS SCHECK^{1,2}, PETER A. BUTLER², CHRISTOPH FRANSEN³, VOLKER WERNER⁴, and STEVEN W. YATES^{5,6} — ¹IKP, TU-Darmstadt, 64289 Darmstadt, Germany — ²Dept. of Physics, Oliver Lodge Laboratory, University of Liverpool, Liverpool L69 7ZE, UK — ³WNSL, Yale University, New Haven CT-06520-8120, USA — ⁴IKP, Universität zu Köln, 50937 Köln, Germany — ⁵Dept. of Physics and Astronomy, University of Kentucky, Lexington KY-40566-0055, USA — ⁶Dept. of Chemistry, University of Kentucky, Lexington KY-40506-0055, USA

An evaluation of data obtained in (n,n' γ) experiments reveals strong M1 $3_i^- \rightarrow 3_1^-$ transitions in nuclei near the N=50 (⁹²Zr, ⁹⁴Mo and ⁹⁶Mo), Z=50 (¹¹²Cd and ¹¹⁴Cd) and N=82 (¹⁴⁴Nd) shell closures. The observed $\langle 3_1^- || M1 || 3_i^- \rangle$ matrix elements scale with the $\langle 2_1^+ || M1 || 2_{ms}^+ \rangle$ matrix elements, and the energy difference between the initial 3_i^- state and the 3_1^- octupole phonon is proportional to the $|\langle 3_1^- || E3 || 0_{gs}^+ \rangle|$ matrix element. The possibility of assigning the states of interest as octupole mixed-symmetry states is discussed.

HK 57.8 Thu 18:15 O-1

Vergleich des confined β -soft Rotor Modells mit einem mi-

kroskopisch kollektiven relativistic mean field Hamiltonian am Beispiel von ^{150,152}Nd * — ●ANDREAS KRUGMANN¹, ZHIPAN P. LI², JIE MENG³, NORBERT PIETRALLA¹ und DARIO VRETENAR⁴ — ¹IKP, TU Darmstadt — ²School of Phys. Sc. and Tec., SWU Chongqing, China — ³School of Phys., PKU, China — ⁴Physics Dep., Fac. of Sc., Univ. of Zagreb, Croatia

Ein Vergleich zwischen den analytischen Wellenfunktionen des Confined β -soft (CBS) Rotor Modells [1] und einem kollektiven Hamiltonian, der auf dem relativistischen Mean Field (RMF) Modell basiert [2], wurde für Niederenergie-Zustände der Grund- und β -Bande von ^{150,152}Nd durchgeführt. Die beiden Modelle zeigen eine bemerkenswerte Übereinstimmung sowohl in den Energien, den B(E2)-Werten, als auch im Centrifugal stretching und den Wellenfunktionen. Es werden vergleichende Rechnungen vorgestellt, die den CBS-Ansatz eines Kastenpotenzials mit einer inneren Potenzialwand, die sich mit steigender Valenznukleonenzahl zu höheren Deformationen verschiebt, auf mikroskopische Weise bestätigen [3].

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[1] N. Pietralla *et al.*, Phys. Rev. C **70**, (2004) 011304(R).

[2] Z. P. Li, T. Nikšić, D. Vretenar, J. Meng, G. A. Lalazissis and P. Ring, Phys. Rev. C **79**, (2009) 054301.

[3] A. Krugmann *et al.*, submitted to J. Phys. G.