HK 25: Kernphysik / Spektroskopie

Zeit: Mittwoch 11:15–12:45 Raum: D

HK 25.1 Mi 11:15 D

Quadrupole moment of the 8^+ yrast state in ^{84}Kr* — •Ronald Schwengner[1], Dimiter Balabanski[2], Gerda Neyens[2], Nadia Benouaret[2], Dana Borremans[2], Nico Coulier[2], Marieke De Rydt[2], Georgi Georgiev[2], Stephen Mallion[1,2], Georgi Rainovski[1,3], Gencho Rusev[1], Stefanie Teughels[2], and Katrien Vyvey[2] — [1]Forschungszentrum Dresden-Rossendorf, 01314 Dresden, Germany — [2]Katholieke Universiteit Leuven, 3001 Leuven, Belgium — [3]University of Sofia, 1164 Sofia, Bulgaria

The quadrupole moment of the 8^+ yrast state in ^{84}Kr was measured using the level-mixing spectroscopy technique to be $Q = 36(4)$ $e$fm^2. The result is compared with predictions of the shell model using common sets of effective charges. The comparison of experimental quadrupole moments with calculated values for 8^+ states in Kr, Sr and Zr isotopes with $N = 48$, 50 and for $9/2^+$ states in isotopes with $N = 47$, 49 suggests a modification of the effective charges used in this region. The results have been published in Ref. [1].

[1] R. Schwengner et al., Phys. Rev. C 74, 034309 (2006).

* Supported by the European Commission, FP5 programme, under contract HPRICT199900110.

HK 25.2 Mi 11:30 D

Shape fluctuation and the collisional damping width of the giant dipole resonance in A∼84 — •Sarla Rathi — Institut für Kernphysik, Technische Universität Darmstadt, 64289 Darmstadt, Germany

One of the important issues in the GDR studies is to separate the contributions of the widths from the different damping mechanisms so that their dependence on temperature (T) and angular momentum (J) can be studied. The spreading of the GDR strength is mainly due to the collisional damping and the shape fluctuations. In this field, there are many open questions, both in theory and experiment. The thermal shape fluctuation model (TSFM) has been reasonably successful in explaining the data, except in certain nuclei like Cu, Sn, Au, Pb at low T. We shall present the comparison of the experimental results in the mass region A∼84 with a phenomenological model [1]. The collisional damping width (Γ_0) in the system ^{28}Si +^{58}Ni [2], (which lies away from the nearby stable nuclei) has been extracted using the shape fluctuation model analysis. The energy dependent average strength function is calculated and used in the statistical model code CASCADE. The calculated gamma spectrum is then compared with the experimental one to extract the value of Γ_0. Further, results on the exclusive T and J dependence of Γ_0 will be reported.

[1] D. Kusnezov, Y. Alhassid, and K. A. Snover, Phys. Rev. Lett. **81**, 542 (1998).

[2] S. Rathi, Phys. Rev. C. **74**, 024608 (2006).

HK 25.3 Mi 11:45 D

Dipole response of ^{88}Sr up to the neutron-separation energy* — •Ronald Schwengner[1], Nadia Benouaret[1,2], Gencho Rusev[1], Roland Beyer[1], Friedrich Doenau[1], Martin Erhard[1], Eckart Grosse[1,3], Arnd Junghans[1], Joakim Klug[1], Krasimir Kosev[1], Latchesar Kostov[4], Chitra Nair[1], Nicolay Nankov[1,4], Klaus-Dieter Schilling[1], and Andreas Wagner[1] — [1]Forschungszentrum Dresden-Rossendorf, 01314 Dresden, Germany — [2]Université d'Alger, 16111 Alger, Algerie — [3]Technische Universität Dresden, 01062 Dresden, Germany — [4]INRNE Sofia, 1784 Sofia, Bulgaria

Dipole and quadrupole excitations in the semimagic $N = 50$ nucleus ^{88}Sr were investigated at the superconducting electron linear accelerator ELBE with bremsstrahlung produced at electron energies of 9.0, 13.2, and 16.0 MeV. About 160 γ transitions were identified up to 12 MeV. By using polarized photons linear polarizations of about 50 γ transitions were measured. In the energy range of 6 – 12 MeV there is only one $M1$ transition while all other transitions have $E1$ character. Statistical methods were applied in order to filter out inelastic transitions and to correct the intensities of the ground-state transitions for their branching ratios. The photoabsorption cross section obtained in this way provides information about the extension of the Giant Dipole Resonance towards energies below the neutron-separation energy. The experimental results are compared with existing data beyond the neutron-separation energy and with predictions of a Quasiparticle-Random-Phase-Approximation.

* Supported by the DFG under contract DO466/1-2.

HK 25.4 Mi 12:00 D

Isomeric Spectroscopy in the N=Z=41 nucleus ^{82}Nb — •Lucia Cáceres[1,2], Magdalena Górska[1], Andrea Jungclaus[2], Paddy Regan[3], and Adam Garnsworthy[3] for the RISING-Collaboration — [1]GSI Darmstadt, Planckstraβe 1, Darmstadt, Germany — [2]Departamento de Física Teórica, Universidad Autónoma de Madrid, Spain — [3]Department of Physics, University of Surrey, Guildford, UK

The N=Z=41 nucleus ^{82}Nb has been studied following the projectile fragmentation of a ^{107}Ag beam at an energy of 750 MeV/u on a 4007 mg/cm^2 ^{9}Be target. The experiment was part of the Stopped Beam Campaign using the Rare Isotope Spectroscopic Investigation at GSI (RISING) setup. Its main goal was the identification of isomeric states of the N=Z odd-odd nuclei in the 80<A<90 region which sheds light on the competition between T=1 and T=0 pairing correlations. The projectile fragments were separated by the GSI FRagment Separator (FRS) and identified unambiguously by means of their magnetic rigidity, time of flight and energy loss. The ^{82}Nb ions were stopped in a plastic layer of 7 mm thickness. The stopper was viewed by a γ-ray array of EUROBALL Cluster detectors. The ground state of ^{82}Nb has been previously reported to be of a T=1, I=0^+ nature. In the current work three delayed γ-ray transition with energies of 123 keV, 418 keV and 638 keV were identified and associated with the ^{82}Nb residues. The isomeric half-life value was extracted. The status of the experimental analysis, results and a discussion of the structure based on the systematic of T=1 isobars ^{78}Sr, ^{82}Zr, ^{86}Mo will be presented.

HK 25.5 Mi 12:15 D

S277 - A one-nucleon knockout experiment at the FRS* — •Peter Maierbeck for the S277-Collaboration — E12, Physik Department TU München

The structure of neutron-rich nuclei is at the center of the current focus of theoretical and experimental investigations. Due to the influence of the residual interaction between valence orbitals the shell structure is expected to change locally. For calcium isotopes, a new shell closure for neutron number N=34 is predicted[1]. Knockout experiments are a tool to probe the single-particle structure of nuclei and therefore to test the theoretical predictions.

In April 2006 we performed a one-nucleon knockout experiment at the FRS at GSI. A 500 MeV/nucleon ^{86}Kr primary beam was fragmented on a ^{9}Be production target. The FRS was used to identify the primary fragments. The knockout reactions of interest were induced in a secondary target (^{9}Be) placed at the intermediate focus of the FRS. The second half of the FRS provided the identification of the fragments after one-nucleon removal and the measurement of their longitudinal momentum distribution from which the angular momentum of the knocked-out nucleon is determined. For fragment identification and tracking, different detector systems (TOF, MUSIC, TPC) were used. The Miniball gamma-ray spectrometer was used to tag reaction channels in which the residual nucleus was in an excited state.

The status of the analysis and preliminary results will be presented.

[1] M. Honma et al., Phys. Rev. C65, 061301 (2002)

* Supported by BMBF (06MT190 and 06MT238).

HK 25.6 Mi 12:30 D

The experimental determination of a nuclear matrix element for the double-beta decay of ^{96}Zr through charge-exchange reactions — •H. Dohmann, D. Frekers, E.-W. Grewe, S. Hollstein, and J.-H. Thies — Institut für Kernphysik, Westfälische Wilhelms-Universität, D-48149 Münster

We have used the (d,^{2}He)-reaction on ^{96}Mo to determine the GT$^+$ strength distribution in ^{96}Nb. The (d,^{2}He)-reaction has been established as a high-resolution probe, which selectively excites GT transitions in β^+-direction. The experiment was performed at the KVI Groningen using the BBS spectrometer. Resolutions of 100 keV have routinely been achieved. The extracted GT$^+$ strength is used to determine one part of the double-beta decay matrix element. The double-beta decay can be described by two sequential single beta decays. These decays can be investigated separately in charge exchange reactions on the initial and final nucleus using (d,^{2}He) and (^{3}He,t) as the alternatives to (n,p) and (p,n) reactions. In the present case we observe that

most of the GT^+-strength is concentrated in a single low lying state.