HK 46: Kernphysik / Spektroskopie

Zeit: Donnerstag 14:15–15:15 Raum: B

HK 46.1 Do 14:15 B

Low-energy dipole excitations as a manifestation of neutron and proton skins — •Nadia Tsoneva and Horst Lenske — Institut für Theoretische Physik, Universität Giessen, Germany

Dipole excitations located close to the particle emission threshold have been investigated in Sn isotopes, the N=82 isotones, 208Pb and the neighbouring even-odd 207Pb nuclei. For this purpose, a method incorporating both HFB and multi-phonon QPM theory was developed. By analyzing the transition densities we find a characteristic pattern for the PDR modes making them a genuine mode of excitation, different from the traditional GDR. This interpretation is strongly supported by the observation that a connection between neutron skins thickness and the total PDR strength is found. The theory is used to investigate the evolution of the PDR strength with the neutron excess for the Z=50 isotopic chain and N=82 isotones. The calculations are compared to recent data from photon scattering experiments. Of special interest was the region of tin nuclei ^{100}Sn-^{110}Sn and in particular the most exotic ^{100}Sn, where a transition from a neutron to a proton skin happens and correspondingly a transformation of the neutron PDR mode into a proton is obtained. Our calculations also point to an interesting relation between the PDR strength and the (relative) location of the proton and neutron particle emmission thresholds which seem to define additional constraints.

Supported by DFG, project Le 439/2-5.

HK 46.2 Do 14:30 B

g-factor measurements in neutron-rich Sn isotopes using relativistic isomeric beams produced by U-fission at Rising, GSI — •Gabriela Elena Ilie for the g-RISING-Collaboration — IKP, University of Koln, Koln, Germany — NIPNE, Bucharest, Romania

Measurements of the magnetic moments of excited nuclear states can be sensitive probes of nuclear wave functions, and can allow a detailed comparison with those obtained from theoretical models. The isomeric g-factors were measured using the Time-Differential Perturbed Angular Distribution method. The nuclei of interest were produced in a relativistic fission reaction of ^{238}U beam with 750 MeV per nucleon, provided by the SIS synchrotron at GSI, impinging on a thin Be target. The fission fragments of interest were produced in this reaction were then separated and identified using the FRagment Separator (FRS). The FRS spectrometer is equipped with standard detection equipment which allows the selection of the fully stripped fragments. The final reaction products were stopped in a Cu plate which was placed between the poles of an electromagnet, providing a hyperfine perturbation-free environment for the implanted isomers. After implantation the nuclei of interest were identified based on event-by-event time correlation between the ions and the delayed γ-rays de-exciting the isomers. The γ ray de-exciting the isomeric levels were detected with eight Cluster Ge detectors mounted in a ring in the horizontal plane. An overview of the experimental technique will be given and results of the experiment will be reported. Work supported by BMBF grant 06 KY 205I.

HK 46.3 Do 14:45 B

Schottky Mass and Half-life Measurements of Neutron-rich Nuclides — •L. Chen[1,2], K. Beckert[1], P. Beller[1], F. Bosch[1], D. Boutin[1,2], R.S. Chakrawarthy[3], B. Franzke[1], H. Geissel[1,2], R. Knöbel[1,2], C. Kozhuharov[1], S.A. Litvinov[1,2], Y.A. Litvinov[1,2], Z. Liu[4], F. Montes[5], G. Münzenberg[1], F. Nolden[1], W. Plass[2], Z. Podolyak[4], C. Scheidenberger[1,2], M. Shindo[6], M. Steck[1], G. Vorobjev[1], P.M. Walker[4], H. Weick[1], and M. Winkler[1] — [1]GSI, Darmstadt — [2]JLU, Giessen — [3]TRIUMF, Vancouver — [4]Uni. Surrey — [5]MSU, East Lansing — [6]Uni. Tokyo

Masses and half-lives of a large number of neutron-rich nuclei in the element range from U to Tl were measured in a recent Schottky run.

These nuclides were produced by fragmenting ^{238}U primary beam with intensities of up to $2{\cdot}10^9$ ions/spill in Be (4g/cm^2) production target at the entrance of the Fragment Separator FRS. The neutron-rich projectile fragments were separated by the FRS and injected into the Experimental Storage Ring ESR. The stored ions were electron-cooled, and their revolution frequencies and intensities have been measured with time-resolved Schottky Mass Spectrometry (SMS).

We have identified 4 new isotopes and meansured the masses of tens of isotopes for the first time. For the new isotope ^{235}Ac also the half-life has been measured in addition. The principle of mass and half-life measurements by using SMS will be discussed, and the status of our data analysis will be presented.

HK 46.4 Do 15:00 B

Search for the shape-isomer in ^{235}U — •Stephan Oberstedt[1], Andreas Oberstedt[2], and Michael Gawrys[3] — [1]EC-JRC IRMM, B-2440 Geel — [2]Dept. of Natural Science, Örebro University, S-70182 Örebro — [3]Dept. of Fundam. Physics, Chalmers Uni. of Technology, S-41296 Göteborg

The need to improve the knowledge about the double- or even triple-humped fission barrier initiated a systematic investigation of shape-isomeric decay modes in actinide nuclei. At present, the population and the principle decay mode in odd-A uranium isotopes is of particular interest for improving nuclear reaction models. Neither of both is known today, and different half life systematics give predictions, which range across up to five orders of magnitude.

Recently, the IRMM isomer spectrometer NEPTUNE [1] was used to search for the shape-isomer in ^{235}U using the reaction ^{234}U(n, f) at E_n = 0.95 and 1.27 MeV. For the first time shape-isomeric fission with a tentative half life $T_{1/2}$ = (4.5 ± 0.3) ms has been observed

[1] S. Oberstedt et al., DPG Spring Meeting, Hadrons and Nuclei, München (2006) HK57.4