HK 49 Kernphysik/Spektroskopie

Zeit: Donnerstag 17:00–18:30 Raum: C

Gruppenbericht

HK 49.1 Do 17:00 C

Investigation of mixed-symmetry states in ^{94}Mo by means of high-resolution electron and proton scattering* — •O. Burda[1], N. Botha[2], J. Carter[3], R.W. Fearick[2], S.V. Förtsch[4], C. Fransen[5], H. Fujita[3,4], M. Kuhar[1], A. Lenhardt[1], P. von Neumann-Cosel[1], R. Neveling[4], N. Pietralla[6], V.Yu. Ponomarev[1], A. Richter[1], E. Sideras-Haddad[3], R. Smit[4], and J. Wambach[1] — [1]Institut für Kernphysik, Technische Universität Darmstadt — [2]Physics Department, University of Cape Town — [3]School of Physics, University of the Witwatersrand — [4]iThemba LABS, Somerset West — [5]Institut für Kernphysik, Universität zu Köln — [6]Department of Physics and Astronomy, SUNY Stony Brook

The nucleus ^{94}Mo is a well studied example for the existence of one-phonon and two-phonon mixed-symmetry (ms) states [1]. High-resolution electron scattering (at the S-DALINAC) and proton scattering (at the iThemba LABS) experiments were performed studying the excitation of 2^+ states. Energy resolutions $\Delta E \approx 30$ keV (FWHM) were achieved. Due to sensitivity of (e,e′) and (p,p′) reactions to the one-phonon components of the wave function a combined analysis of the measured form factors and angular distributions provides a unique test of the phonon character of the ms state and its assumed isovector character in the valence shell. Furthermore, the purity of two-phonon states can be extracted. Comparison to QPM, shell-model and IBA-2 calculations is presented.

[1] C.Fransen et al, Phys. Rev. C 67 (2003) 024307.

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Gruppenbericht

HK 49.2 Do 17:30 C

Pre-equilibrium emission in 1.2 GeV proton induced reactions between Al and Th — •Frank Goldenbaum[1], Claus-Michael Herbach[2], Dietrich Hilscher[2], Ulrich Jahnke[2], V.G. Tishchenko[2], Joel Galin[3], Alain Letourneau[3], Alain Peghaire[3], Detlef Filges[1], Ludwik Pienkowski[4], Udo Schoeder[5], and Jan Toke[5] — [1]Forschungszentrum Jülich gmbh, D-52428 Jülich — [2]Hahn-Meitner Institut, D-14109 Berlin — [3]GANIL, F-14076 Caen — [4]Heavy Ion Laboratory, 02-093 Warszawa, Poland — [5]Univ.Rochester, NY 14627 USA

Proton induced spallation reactions at 1.2 GeV incident energy with targets between Al and Th have been studied. Energy spectra and angular distributions for ^{1,2,3}H, ^{3,4,6}He, ^{6,7,8,9}Li and ^{7,9,10}Be isotopes have been measured and compared to results of intra-nuclear cascade and statistical model calculations. While the evaporation, mean excitation energy and linear momentum transfer is in good agreement with the data, pre-equilibrium emission cannot be accounted for in these simulations. For deuterons, pre-equilibrium emission is shown to be well described by surface coalescence while other mechanisms are required for ^{4}He and heavier clusters.

HK 49.3 Do 18:00 C

Timescale of fission in GeV proton induced reactions — •Frank Goldenbaum[1], Claus-Michael Herbach[2], Dietrich Hilscher[2], Ulrich Jahnke[2], Joel Galin[3], Alain Letourneau[3], Udo Schroeder[4], and V.G. Tishchenko[2] — [1]Forschungszentrum Jülich GmbH D-52428 Jülich — [2]Hahn-Meitner-Institut, D-14109 Berlin — [3]Ganil, F-14076 Caen — [4]Univ.Rochester, New York 14627, USA

The excitation energy dependence of fission probability P_f in 2.5 GeV proton induced reactions on Au, Bi, and U has been studied whereby E^* is deduced eventwise form the multiplicity of evaporated light particles. Irrespective of the initial fissility for all three target nuclei at the highest E^* of 1000 MeV P_f amounts to approx. 30%. Intra-nuclear-cascade/statistical model calculations provide a very satisfying reproduction of the observed evolution of $P_f(E^*)$ with E^*. No extra transient delay is introduced showing fission to be decided upon very fast and early in the long deexcitation chain towards scission. The fast decision to fission is supplemented by the observation that a major part (about 80% at E^*=600-900MeV) of all evaporated alpha particles is emitted prior to scission—showing the entire fission process being relatively slow.

HK 49.4 Do 18:15 C

Dipole response of neutron-rich even-odd nuclei around ^{132}Sn — •Adam Klimkiewicz for the LAND-FRS collaboration — Gesellschaft für Schwerionenforschung (GSI), D-64291 Darmstadt — Instytut Fizyki, Uniwersytet Jagielloński, PL-30-059 Kraków, Poland

The unstable neutron-rich nuclei $^{129-133}$Sn and ^{133,134}Sb isotopes were produced by in-flight fission of a primary ^{238}U beam ($E_{kin} \approx 500$ MeV/u) at GSI,Darmstadt, and were separated in flight from other reaction products by means of the fragment separator FRS. Coulomb excitation of these isotopes in a Pb target was measured at the LAND setup and the dipole strength distribution above the neutron separation threshold was deduced. Below the giant dipole resonance at around $E^* \approx 15$ MeV, a sizeable fraction of dipole strength is found in all isotopes. In case of the even-even ^{130,132}Sn isotopes, this strength was discussed in terms of a pygmy resonance in an earlier publication [1]. Dipole strength right at the neutron separation threshold appears in the isotopes with an odd neutron number being related to the unpaired neutron. An attempt was made to analyze this strength within the direct breakup model [2,3] which describes non-resonant dipole transitions into the continuum.

[1] P.Adrich et al.,Phys. Rev. Lett.**95**(2005)132501
[2] R.Palit et al.,Nucl. Phys. A**731**(2004)235-248
[3] S.Typel,G.Baur, Phys. Rev. C**64**(2001)024601