

Investigation of exotic nuclei with absolute transition probabilities

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Nuclei far from the valley of stability are of current interest in nuclear structure physics. Especially, big effort has been devoted to investigate the evolution of collectivity of nuclei with large isospin.

In order to gain experimental data related to this topic reactions with radioactive beams or deep inelastic reactions have been successfully used. With both types of reactions absolute transition probabilities can be determined using the plunger technique. Dedicated plunger devices have been designed to accommodate the specific issues imposed by these reaction types. In this presentation the following examples will be presented:

1. Reaction with radioactive beams at intermediate energies (≈ 100 MeV/u). The experiments were performed at the NSCL/MSU. Low lying yrast states in 58,60,62Cr isotopes were populated in 1p-knockout reactions using high purity 59,61,63Mn-beams at ≈ 95 MeV/u which were produced by fragmentation of a 82Se beam at 140 MeV/u on a Be target. The 59,61,63Mn-beams were separated from other fragments by the A1900 separator. The reaction products of the secondary knockout reaction were identified by the S800 spectrograph and the gamma-spectra were measured by the Segmented Germanium Array (SeGA). The measured transition probabilities will be compared to shell model calculations as well as to neighboring Fe nuclei close to the sub-shell closure at N=40.

2. As an example of a lifetime measurement using deep inelastic reactions at grazing angles an experiment on 84,86Se will be presented. The experiment was performed at the LN Legnaro using the PRISMA-AGATA setup with a plunger device especially constructed for such experiments. First preliminary results will be discussed.

Primary author: DEWALD, Alfred (IKP Universität zu Köln)

Presenter: DEWALD, Alfred (IKP Universität zu Köln)

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