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Nuclear structure of the neutron-deficient tin isotopes close to 100Sn

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In the last years the robustness of the proton shell closure Z=50 has been studied when N=50 is approached: the excitation energy together with the reduced transition probabilities of the low-lying states provides a clear evidence of the shell evolution along the whole Sn isotopic chain.
However, the presence of low-lying isomers has limited the investigation of the electromagnetic properties of the first excited states; for this reason the neutron-deficient Sn isotopes have been studied only via Coulomb excitation measurements, employing radioactive beams.

The excitation energy of the first 2+ and 4+ states is well known and it is rather constant along the whole Sn isotopic chain. On the other hand, for the neutron-deficient Sn isotopes the B(E2;2+⟶0+) values suffer from large experimental uncertainties and the information on B(E2;4+⟶2+) is completely absent, which make the interpretation of the shell evolution controversial.

In order to obtain a precise estimation of the reduce transition probabilities in the region close to 100Sn, a multi-nucleon transfer reaction was used together with the Recoil Distance Doppler-Shift method as an alternative and complementary solution to the previously-performed Coulomb excitation measurements. This allowed to directly measure the lifetime of 2+ and 4+ states in 106,108Sn for the very first time and then to extract the B(E2) values of the low-lying states.

Large-scale shell-model calculations have been performed by taking into account the new experimental results. In particular, the comparison of the B(E2;4+⟶2+) values with the theoretical predictions has shed light on the nuclear structure in the vicinity of the proton drip line.

Selected session

Nuclear Structure and Dynamics

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