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Quadrupole Correlations in Neutron-Deficient Sn Isotopes via Lifetimes Measurements

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Summary

The shell structure of nuclei with few nucleons outside the double-shell closure Z=N=50 has attracted a large interest. Several studies were performed in this region to examine the robustness of the proton shell closure when N=50 is approached.

Experimental results such as the excitation energy of the first 2+ states and the reduced transition probabilities should provide a clear evidence of the shell evolution in this mass region. However, while the systematic of the first 2+ state excitation energy is well known and its behavior is rather constant along the whole Sn isotopic chain, the information on B(E2; 2+⟶0+) for the neutron-deficient Sn isotopes suffers from large experimental uncertainties which makes the interpretation of the shell evolution controversial.

Recently the region in the vicinity of Z=N=50 has been investigated at GANIL in order to perform high precision measurement of the B(E2) values for the 4+⟶2+ and 2+⟶0+ transitions. The lifetime of the low-lying states in 106,108Sn were measured with the Recoil Distance Doppler-Shift (RDDS) method, employing the differential Cologne plunger device. The g rays were detected with 8 AGATA Triple Clusters, placed at backward angles, while the complete A and Z identification of the projectile-like fragments was done by the VAMOS++ spectrometer. The unique capabilities of AGATA-VAMOS++ setup allowed a clear selection of the channels of interest and a proper event-by-event Doppler correction.

The region of the neutron-deficient Sn isotopes has been studied mainly via relativistic Coulomb excitation reactions and the reduced transition probabilities have been indirectly obtained with a large experimental uncertainties. The AGATA-VAMOS++ experiment represents the very first lifetime measurement in this neutron-deficient region and it will provide complementary information to the previous studies.
In this contribution the status of the data analysis and the first results on lifetimes will be presented.

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