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Lifetime measurements in 105Sn

Nowadays, a great amount of experimental effort is devoted to the study of the shell closures far from stability. One of the most studied case is the doubly-magic and self-conjugated 100Sn nucleus.

The spectroscopy properties of the tin isotopic chain, when approaching the 100Sn [1], have in particular been subject to intense study. Tin nuclei exhibit a seniority type of behavior [2] but the BE(2) values of the 2+ states in the more neutron deficient isotopes do not decrease as predicted [3,4,5]. Due to the presence of 8+ state isomers in the even-even tin isotopes, lifetime measurements of the first excited states are easily obtainable only for the even-odd tin isotopes.

In this context, the lifetimes of 105Sn has been investigated through the reaction 50Cr(58Ni,2pn). The detection setup consists of the Compton-suppressed HPGe spectrometer GALILEO [7] in coincidence with the charged particle Si detector EUCLIDES [8] and four LaBr scintillators at 90 degrees. This setup allows to perform gamma-gamma and gamma-particle coincidences to select the channel of interest. The presence of the plunger device enables one to measure the lifetime of the excited states.

Preliminary results show that the levels of the magnetic band, already observed with the same reaction in 1997 [6] at high angular momentum, are characterized by short lifetimes, in agreement with their M1-band nature. Moreover, the long lifetime found for the highspin state 27/2+ signals the possible presence of a 105Sn core-breaking state.

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