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# Lifetime measurements around A = 100 with pγ-concidence DSAM

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Nuclear level lifetimes, together with branching ratios and multipole-mixing ratios, give access to transitions strengths between excited states. Such information can be used to examine the nature of these states and underlying common structures and can be indicative of nuclear-structure phenomena such as shape coexistence. A method targeting lifetimes of excited low-spin states in the order of fs up to ps is the Doppler-shift attenuation method (DSAM). It uses the continuous velocity decrease of a recoiling nucleus excited by a projectile within a stopper medium and its connection to the Doppler-shift of γ-rays emitted by this nucleus. The detection of the emitted photons in coincidence with the scattered charged projectile gives complete reaction kinematics, allowing the determination of both the recoil velocity and the excitation energy. This way, direct excitations can be selected and feeding from higher-lying excitations is excluded [1].
Such coincidence data have been measured with the SONIC@HORUS array [2] at the 10 MV FN tandem accelerator of the University of Cologne. It consists of the γ-ray detector array HORUS with 14 HPGe detectors. Mounted into the center of HORUS is SONIC, a particle detector array with 12 silicon detectors positioned in three rings under backward angles where scattered particles are detected, exploiting the higher momentum transfer under backward angles. Together, SONIC@HORUS allows to form 168 particle-γ detector combinations resulting in various different Doppler angles. Lifetimes of dozens of states can be extracted from a single experiment.
In recent years, extensive studies with the pγ-coincidence DSAM have been performed on the isotopic chains of Sn [3], Ru [1,4,5] and Te [6] at or near the Z = 50 and N = 50 and 82 shell closures, inspecting nuclei at closed shells as well as towards midshell. In this contribution, the pγ-coincidence DSA method will be presented and some results of recent experiments will be shown.

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