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Lifetime measurements in the sub-picosecond regime with the pγ-coincidence Doppler-shift attenuation method

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Nuclear level lifetimes are important properties of the atomic nucleus, as they yield information about transition strengths and nuclear wave functions. An established method to determine lifetimes in the sub-picosecond regime is the particle-γ coincidence Doppler-shift attenuation method (pγ-DSAM) [1]. As opposed to most DSAM approaches, the additional coincident detection of emitted γ-ray and scattered projectile allows the selection of excited states, thus eliminating feeding contributions. The coincidence data is obtained with the SONIC@HORUS detector array [2] situated at the 10 MV FN tandem accelerator in Cologne. It consists of 12 silicon particle detectors and 14 high-purity germanium (HPGe) detectors for the detection of γ-rays. With this method and setup, lifetimes of several dozens of nuclear levels can be determined in a single experiment. Lately, the DSA method has been used to determine lifetimes of excited low-spin states of nuclei in the mass region of A ≈ 100 and above. Recent results on Ru, Sn [3] and Te [4] isotopes will be presented in this contribution.
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[1] A. Hennig et al., NIM A 794, 171 (2015).
[2] S.G. Pickstone et al., NIM A 875, 104 (2017).
[3] M. Spieker et al., Phys. Rev. C 97, 054319 (2018).
[4] S. Prill et al., accepted at Phys. Rev. C

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