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Fast timing studies at ISOLDE: highlights and perspectives

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The measurement of absolute nuclear transition probabilities is a very sensitive tool to study the structure of the atomic nucleus. Direct access to transition rates can be achieved via the lifetime of nuclear levels de-populated in radioactive decay. The Advanced Time-Delayed (ATD) method, or Fast timing, is a well-established technique to measure lifetimes ranging from 5 ps to 50 ns with count-rates as low as 5 decays per second [1]. The method provides insight into the structure of the nuclear levels in a complementary manner to other experimental techniques such as Coulomb excitation or collinear laser spectroscopy. Experiments over the last few years have exploited the potential of the technique in beta-decay spectroscopy and have explored its application to high-spin reactions and microsecond isomer studies [2].
The presentation will overview results obtained at ISOLDE, with physics cases spanning over the mass range A = 30 −230. The technical advances leading to an enhanced sensitivity of the ATD method such as new scintillator crystals [3] will be underlined and future opportunities will be discussed.

[1] H. Mach, R. Gill, M. Moszynski, NIM A280 (1989) 49
[2] H. Mach et al., J. Phys. G 31 (2005) S1421–S1426
[3] M. Moszynski et al., IEEE Trans. Nucl. Science 55 (2008) vol. 3

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