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Fast-timing spectroscopy with the Nu-ball2 spectrometer

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The high-precision fast-timing method has been used in a high-statistics experiment at ALTO@IJCLab to perform lifetime measurements of excited states in exotic nuclei. These observables and their corresponding transition probabilities are key fingerprints for the structure of atomic nuclei, as they are sensitive to small components of the wave function. Neutron-rich nuclei have been populated in a two-step fission-induced experiment. In the first stage, the neutron beam was produced by the LICORNE source in an inverse kinematics reaction with a pulsed ^7Li beam delivered by the Tandem accelerator, incident on an H_2 gas cell. The resulting neutron beam with an average energy of about 2 MeV was used in a second step to induce fissions on the ^{238}U secondary target. The hybrid high-efficiency Nu-ball2 array comprising 24 clover detectors and 20 UK FATIMA $\text{LaBr}_3(\text{Ce})$ scintillators was used to detect the emitted gamma rays. The physics cases encompass various topics, from lifetime measurements and building the level scheme to statistical properties studies and isomeric fission ratios investigations. This talk will focus on lifetime measurements of excited states, highlighting the improvements with respect to the previous campaign and presenting the first preliminary results.

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