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Recent highlights from lifetime measurements with rare isotope beams: techniques and results

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Two of the compelling questions identified for nuclear science today are "How does subatomic matter organize itself and what phenomena emerge?" and "How did visible matter come into being and how does it evolve?". Excited-state lifetime measurements provide precise and model-independent nuclear structure data of key atomic nuclei to validate nuclear models and pin down scenarios of astrophysical processes. With the advent of advanced gamma-ray arrays such as GRETINA, new experimental techniques have been developed extending the reach of lifetime programs far from the valley of stability. This talk will provide a brief overview of new implementation of Doppler-shift techniques with rare isotope beams and present recent science highlights including findings on shape coexistence phenomena in neutron-rich nuclei, shape evolution along N=Z, and properties of drip-line nuclei. Then discussion will focus on electromagnetic responses of weakly-bound neutron-rich nuclei and a possible interplay between a nuclear halo and deformation.