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The spectroscopy of the shape isomer in ^{238}U by Nu-ball spectrometer

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We report on a new investigation of the fission shape isomer in ^{238}U [1-3], performed with the Nu-Ball high-efficiency hybrid γ -ray spectrometer [4,5] at IJCLab, Orsay, France. The Nu-Ball array combines 24 clover HPGe detectors, 10 coaxial HPGe detectors with BGO shields, and up to 20 LaBr₃(Ce) or PARIS clusters, offering excellent efficiency, energy resolution, and timing performance. When coupled to the LICORNE directional neutron source at the ALTO facility, this setup provides a unique opportunity for precision spectroscopy of neutron-induced reactions with sensitivities far exceeding those of earlier experiments.

In this study, the ^{238}U shape isomer was populated using inelastic neutron scattering, enabling a reexamination of previously reported γ -decay branches originating from the superdeformed second minimum. With significantly higher population cross sections and a substantially larger HPGe detection volume than in the original measurements, the new dataset allows a comprehensive assessment of the decay pathways associated with the isomer.

We will present the results of this investigation, together with their implications for the interpretation of earlier observations and in the broader context of recent studies on actinide shape isomers. These findings contribute to a more robust understanding of isomeric decay modes and fission dynamics in heavy nuclei.

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Primary authors: JOVANCEVIC, Nikola (University of Novi Sad); Dr OBERSTEDT, Stephan (European Commission, European Commission, DG Joint Research Centre, Directorate G – Nuclear Safety and Security, Unit G.2, Retieseweg 111, B-2440, Geel, Belgium); Dr WILSON, Jonathan (IJCLab, 15 rue Georges CLEMENCEAU, 91406 Orsay, France); Dr LEBOIS, Matthieu (IJCLab, 15 rue Georges CLEMENCEAU, 91406 Orsay, France, Université Paris-Saclay, 15 Rue G. Clémenceau, 91406 Orsay Cedex, France); Dr THISSE, Damien (IJCLab, 15 rue Georges CLEMENCEAU, 91406 Orsay, France); Dr ETASSE, David (Laboratoire de Physique Corpusculaire de Caen, 6 Bvd du maréchal Juin, 14050 CAEN CEDEX 4, France); Dr KNEZEVIC, David (Institute of Physics Belgrade, Pregrevica 118, Belgrade, Serbia); Dr DRAGIC, Aleksandar (Institute of Physics Belgrade, Pregrevica 118, Belgrade, Serbia)

Presenter: JOVANCEVIC, Nikola (University of Novi Sad)

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