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Identification of a new nanosecond isomer in neutron-rich 54Sc

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The existence of nuclear isomers offers crucial information for testing nuclear models and understanding shell evolution far from stability. Decay properties including half-lives and transition strengths associated with these isomeric states can be used to characterize them and serve as sensitive probes of their underlying structure.
The second FRIB experiment after it came online involved the production and delivery of a cocktail of neutron-rich nuclei in the region of 54Ca to two distinct high resolution and total absorption focal planes at the FRIB Decay Station initiator (FDSi). This allowed for a thorough decay spectroscopy of the isomeric states investigated in this work. The first is the excited 1+ state, newly identified as a nanosecond isomer and populated following the β decay of 54Ca. The second is a relatively lower-lying state, previously established as a microsecond isomer and populated following the implantation of 54Sc. The presence of these states was inferred from the detection of 247- and 110-keV rays associated with their de-excitation, respectively.
Newly measured and re-evaluated decay properties of these isomers will be presented. Their structure will also be discussed as inferred from interpretations of shell model and ab-initio calculations.

Presenter: OGUNBEKU, Timilehin (Lawrence Livermore National Laboratory)

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