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Search Efforts for the Thorium-229 Nuclear Isomeric Transition
RICKY ELWELL, CHRISTIAN SCHNEIDER, University of California, Los Angeles, JUSTIN JEET, Lawrence Livermore National Laboratory, GALEN O'NEIL, VARUN VERMA, DILEEP REDDY, SAE WOO NAM, National Institute of Standards, ALINA HEIHOFF, RAPHAEL HAAS, DENNIS RENISCH, CHRISTOPH DULLMAN, Johannes Gutenberg University Mainz, LARS VON DER WENSE, University of Colorado Boulder, BENEDICT SEIFERLE, FLORIAN ZACHERL, PETER THIROLF, Ludwig Maximilian University of Munich, EUGENE TKALYA, Lomonosov Moscow State University, ERIC HUDSON, University of California, Los Angeles — The nucleus of ^{229}Th has an exceptionally low-energy isomeric transition in the vacuum-ultraviolet (VUV) spectrum around 8 eV [1,2]. While inaccessible to standard nuclear physics techniques, there are various prospects for a laser-accessible nuclear transition. Our ongoing direct VUV laser search for the transition using thorium-doped crystals will be supplemented by a conversion-electron Mössbauer spectroscopy scheme [3]. In both of these direct excitation schemes, a pulsed dye laser system is used to generate the tunable VUV light. We will also report on the progress of an indirect measurement of the isomeric decay using a superconducting nano-wire single photon imager.

[1] Seiferle, B. et al. Energy of the 229Th nuclear clock transition. Nature (2019).
[2] B. R. Beck et al.: LLNL-PROC-415170 (2009)
[3] von der Wense, L.C. et al. Hyperfine Interact (2019)

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