

Abstract Submitted
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Investigation of the optical transition in the ^{229}Th nucleus: Solid-state optical frequency standard and fundamental constant variation
WADE RELLERGERT, University of California - Los Angeles, DAVID DEMILLE, Yale University, ERIC HUDSON, University of California - Los Angeles — We describe a novel approach to directly measure the energy of the low-lying isomeric state in ^{229}Th . This unique nuclear transition is low enough in energy that it can be studied by laser spectroscopy. Since nuclear transitions are far less sensitive to environmental conditions than atomic transitions, it is shown that the ^{229}Th atoms can be interrogated inside a suitable host crystal without significantly impacting the transition linewidth. The technique might also allow for the construction of a solid-state optical frequency standard that surpasses the precision of current optical clocks, as well as improved limits on the variability of fundamental constants.

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