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A pulsed VUV laser for the search for the thorium-229 nuclear isomeric transition CHRISTIAN SCHNEIDER, JUSTIN JEET, University of California, Los Angeles, EUGENE V. TKALYA, Lomonosov Moscow State University and Nuclear Safety Institute of Russian Academy of Science, ERIC R. HUDSON, University of California, Los Angeles — The nucleus of thorium-229 has an exceptionally low-energy isomeric transition in the vacuum-ultraviolet (VUV) spectrum around 7.8 ± 0.5eV [1]. While inaccessible to standard nuclear physics techniques, there are various prospects for a laser-accessible nuclear transition. Our direct search for the transition uses thorium-doped crystals as samples. In a previous experiment [2] at the Advanced Light Source (ALS) synchrotron, LBNL, we were able to exclude a large portion of the transition lifetime-vs.-frequency region-of-interest (ROF) [3]. We will present the technical aspects of our ongoing efforts at UCLA, including a newly developed pulsed VUV laser system with wide tunability and VUV pulse energies up to $40\mu J$/pulse, the absolute measurement of these pulse energies, and the characterization of the frequency spectrum of the pulsed laser light. A preliminary, updated exclusion region obtained with the new experimental setup will be depicted.

[1] B. R. Beck et al.: LLNL-PROC-415170 (2009)
[2] J. Jeet et al.: Phys. Rev. Lett. 114, 253001 (2015)
[3] E. V. Tkalya et al.: Phys. Rev. C 92, 054324 (2015)

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