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Expanding the Search for Evidence of Nuclear Excitation by Electron Capture to New Nuclear/Atomic Systems C. J. CHIARA, J. J. CARROLL, DEVCOM Army Research Lab — Nuclear excitation by electron capture (NEEC) is a coupled nuclear/atomic process by which the energy released during the capture of an electron into an atomic vacancy excites the nucleus of the atom to a higher-energy state. This phenomenon was proposed theoretically over 40 years ago [1], but the first experimental evidence was not forthcoming until much more recently [2,3], for the nucleus ^{93}Mo . To expand our knowledge of NEEC beyond this single case, we performed an experiment similar to the successful one for ^{93}Mo [2] to search for evidence of NEEC in the nucleus ^{127}Cs . The $T_{1/2} = 55\text{-}\mu\text{s}$ isomer in ^{127}Cs was populated via the $^9\text{Be}(^{123}\text{Sb}, 5n)$ reaction; this isomer is a candidate for NEEC, with excitation possible to a level lying about 2 keV higher in energy. Considerations that went into the design of the experiment, and its subsequent implementation, will be discussed.

- [1] V. I. Goldanskii and V. A. Namiot, Phys. Lett. B **62**, 393 (1976).
- [2] C. J. Chiara et al., Nature **554**, 216 (2018).
- [3] C. J. Chiara et al., Nature **594**, E3 (2021).

Christopher Chiara
DEVCOM Army Research Lab

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