

Abstract Submitted
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Applications of the deformed nucleus of $^{173}\text{Yb}^+$ CONRAD ROMAN, ANTHONY RANSFORD, WESLEY C. CAMPBELL, University of California, Los Angeles — Trapped $^{173}\text{Yb}^+$ ions provide a unique and intriguing opportunity for exploring fundamental atomic physics and quantum information. This $I = 5/2$ isotope of ytterbium has a highly deformed nucleus that has been predicted to lead to dramatic hyperfine induced quenching of certain hyperfine levels in the metastable $^2F_{7/2}$ state. The corresponding decrease in requisite probe laser power that this furnishes may allow for improved operation as an optical atomic clock. Additionally, the $^2F_{7/2}$ state contains 6 magnetic field insensitive clock states that can be used as a basis for an SU(6) qudit, with individual state preparation, manipulation, and readout. Precision measurement of hyperfine splittings in the $^2F_{7/2}$ state should be possible at the same level as the ground state, which allows the ion to act as an electron microscope for nuclear electromagnetic moments, in principle containing structure information up to the magnetic 32-pole moment.

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