Abstract Submitted
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Preparation and detection of a $^{137}Ba^{+}$ hyperfine qubit M.R. DIETRICH, R. BOWLER, N. KURZ, V. MIRGON, J. PIRTLE, J.S. SALACKA, G. SHU, B.B. BLINOV — We report the initialization and state detection of $^{137}Ba^{+}$ hyperfine qubits. We load $^{137}Ba^{+}$ into a linear Paul trap by direct photoionization with a Xe discharge lamp. The qubit is initialized by optically pumping into the magnetic field insensitive hyperfine ground state (F=2 m_f=0). State selective shelving to the metastable $D_{5/2}$ state is accomplished by adiabatic rapid passage using a 1762 nm fiber laser stabilized to a high-finesse cavity, a process which is used for high efficiency state detection. Single qubit rotations are accomplished by RF pulses at the hyperfine splitting (8.037 GHz).

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