Abstract Submitted
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Progress towards a first-of-its-kind ion interferometer[1] JAMES L. ARCHIBALD, C.J. ERICKSON, JAROM JACKSON, MICHAEL HERMANSEN, DEAN ANDERSON, MARK CUNNINGHAM, DALLIN S. DURFEE, Brigham Young University — We are building the first matter-wave ion interferometer that works by exploiting the internal structure of the ions. The completed apparatus will allow novel tests of electromagnetic theory and other fundamental physics. The apparatus consists of a low-velocity intense source (LVIS) for $^{8}7$Sr. Atoms emitted from the LVIS will be ionized using a two-photon transition to an auto-ionizing bound state. Interferometry will be achieved using stimulated Raman transitions between the hyperfine ground states of $^{8}7Sr^{+}$. The laser system that will stimulate these transitions consists of a grating-stabilized, 408 nm master laser which is arranged in a double-pass configuration through a 2.5 GHz frequency-shifter to generate two beams that are detuned from one another by 5 GHz (which corresponds to the hyperfine splitting). These beams are then used to injection lock two slave lasers. We will discuss the theory of operation, potential applications, experimental techniques and our preliminary results.

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