Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Developing a Portable Optical Frequency Standard with Atomic Mercury KAITLIN MOORE, EMILY ALDEN, AARON LEANHARDT, University of Michigan — A two-photon excitation strategy is proposed to couple the $^1S_0$ and $^3P_0$ levels of mercury atoms with zero nuclear spin and in the presence of zero external magnetic field. This excitation strategy could allow for a portable optical frequency standard based on a thermal mercury vapor with a fractional frequency resolution at the $\sim 10^{-15}$ level. The $^1S_0 \rightarrow ^3P_0$ transition requires two photons at 531 nm, which are generated by a compact solid state laser system. Detection of population in the $^3P_0$ state can be accomplished via subsequent excitation to higher-lying excited states, e.g. $^3P_0 \rightarrow ^3S_1$ can be driven with a diode laser at 405 nm. We also discuss a preliminary detection technique involving collisions between mercury atoms in the $^3P_0$ state with ground state ammonia molecules.

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Date submitted: 27 Jan 2012 Electronic form version 1.4