Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Studies of Yb $^1S_0$ – $^3P_0$ clock transitions TAO HONG, CLAIRE CRAMER, ERYN COOK, ANNA MARKHOTOK, WARREN NAGOURNEY, NORVAL FORTSON, University of Washington — We are exploring two quite different methods for observing the ultra-sharp $6s^2\ ^1S_0$ – $6s6p\ ^3P_0$ optical interval in atomic Yb, which is considered a primary candidate for future optical frequency standards [1].In the first method, we observe the 578 nm single photon transition allowed in the odd isotopes through internal hyperfine coupling of the nuclear spin. We shine a 578 nm laser beam on cold Yb atoms held in a magneto-optical trap (MOT), and detect a decrease in MOT fluorescence when the laser is resonant with the clock transition. Our second approach is to use the even Yb isotopes, connecting the $^1S_0$ and $^3P_0$ states by a multi- photon transition [2]. Sharp electromagnetically induced transparency and absorption (EITA) resonance features appear when the photon frequencies combine to equal the $^1S_0$ – $^3P_0$ clock interval. We will describe our initial studies of 2 and 3 photon resonances in Yb, including Doppler-free 3 photon EITA. [1]S. G. Porsev, A. Derevianko, E. N. Fortson, Phys. Rev. A **69**, 021403(R) (2004); H. Katori, in *Proc. 6th Symposium Frequency Standards and Metrology*, edited by P. Gill (World Scienti.c, Singapore, 2002), pp. 323-330 [2]Tao Hong, Claire Cramer, Warren Nagourney, E. N. Fortson, physics/0409051 and to be published in Phys. Rev. Lett.; Robin Santra, Ennio Arimondo, Tetsuya Ido, Crhis H. Greene, Jun Ye, physics/0411197

Claire Cramer
University of Washington

Date submitted: 05 Apr 2005 Electronic form version 1.4