Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Two-photon lock by ground state phase-modulation transfer in rubidium.[1] ADRIAN PEREZ GALVAN, DONG SHENG, LUIS OROZCO, Joint Quantum Institute, Univ. Maryland and NIST — We present a method to lock on resonance the second step of the $5S_{1/2} \rightarrow 5P_{3/2} \rightarrow 5D_{5/2}$ two-photon transition at 776 nm in rubidium by monitoring the changes of population of the $5S_{1/2}$ ground state in a vapor cell. The low probability of excitation in the two-step atomic transition makes the direct observation of population in the final excited state i.e. changes in absorption of the second laser as a function of frequency, very difficult. Monitoring the ground state population instead increases the signal to noise ratio of the two-photon signal. The decrease of the stringent experimental conditions suggests combining the detection method with one of many one-photon spectroscopy techniques. A density matrix model explains well the behaviour of the signal and we show phase sensitive detection of the frequency modulated laser at 780 nm laser as a function of the frequency of the second photon to lock the modulation-free 776 nm laser.

[1]Work supported by the NSF.

Adrian Perez Galvan
Joint Quantum Institute, Univ. Maryland and NIST

Date submitted: 28 Jan 2008 Electronic form version 1.4