Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Subnatural linewidth spectroscopy using a suppression and recovery of trapped Cs atoms CHIN-CHUN TSAI, RAY-YUAN CHANG, MIN-DA TSAI, WEI-CHIA FANG, YI-CHIH LEE, Department of Physics, National Cheng-Kung University, Tainan, Taiwan — Subnatural linewidth in the *8s* Rydberg state has been observed using a suppression and recovery of trapped Cs atoms. The suppression and recovery method has the advantages of requiring low light field for probing laser and providing a zero background. In our experiment, the Cs atoms in the magneto- optical trap (MOT) are radiated by a weak probe laser form $|6S_{1/2}$ F=4$\rangle$ to $|6P_{3/2}$ F=5$\rangle$ for 1000msec; then a coupling laser is superimposed with the probing laser to interact with the MOT atoms for 500msec by alternating the MOT lasers with the coupling laser at 70kHz to avoid the power broadening and the AC stark effect. The coupling laser is scanned from $|6P_{3/2}$ F=5$\rangle$ to $|8S_{1/2}$ F=4$\rangle$. If the coupling laser is off resonance, then the probe laser suppresses the atoms to be loaded into the MOT and results no background signal while probing the MOT florescence. If the coupling laser is on resonance, then the probe laser is induced to be transmitted and the MOT loading is recovered at the alternating stage. This transmitted probe laser field is due to quantum interference and is known as the electromagnetically induced transparency. A subnatural linewidth in the Cs(*8s*) Rydberg state of 3.5MHz is obtained and the intensity dependence on the probing coupling lasers is discussed.

Chin-Chun Tsai
Department of Physics, National Cheng-Kung University, Tainan, Taiwan

Date submitted: 30 Jan 2007 Electronic form version 1.4