

Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Light shift and ac Stark Effect on Ladder-Type Electromagnetically Induced Transparency in Cold Cs Atom¹ CHIN CHUN TSAI, ZONG-SYUN HE, LI-REN LIU, Department of Physics, National ChengKung University, Tainan, Taiwan — Light shift and power broadening are usually occurred in a strong field such as experiments using pulsed lasers. However, these effects have been observed in a cw weak field regime by measuring the ladder-type electromagnetically induced transparency (EIT) in a magneto-optical trap (MOT) and a room-temperature cell as a reference simultaneously. The cesium atoms was trapped in a MOT with temperature about 200 μ K and 10^9 atom/cm³. A diode laser set on resonance to Cs $|6s^2S_{1/2}, F = 4\rangle \rightarrow |6p^2P_{3/2}, F = 5\rangle$ as a probe field and a counter-propagating Tisapphire laser coupled $|6p^2P_{3/2}, F = 5\rangle \rightarrow |8s^2S_{1/2}, F = 5\rangle$ to form a ladder-type EIT on both MOT and room-temperature cell. The line width of the EIT signal was broadened from 3.2 MHz to 25.2 MHz while the Rabi frequency of coupling laser changed from 1.5 MHz to 13.0 MHz. A light shift was measured from -0.2 MHz to +0.6 MHz as increasing the coupling power in MOT EIT while conditions on room-temperature EIT was fixed. A theoretical discussion and simulation are performed to compare with the experimental spectra.

¹This work is supported by the Ministry of Science and Technology, Taiwan

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Date submitted: 30 Jan 2015

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