Abstract Submitted
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Phase Jumps in an Electro-magnetically Induced Transparency System[1] F.A. NARDUCCI, Naval Air Systems Command, J. NOBLE, St. Mary's College of Southern Maryland, G.R. WELCH, Texas A&M, J.P. DAVIS, Naval Air Systems Command — We have taken a closer look at the dynamics of an EIT system when the relative phase of the two lasers is abruptly changed. The absorption of the probe field rapidly increases to a value that can exceed even the ordinary two-level absorption, then slowly decays back down to the induced transparency level. This system has been previously studied by some of us theoretically [1] and experimentally [2,3]. We show that the timescale for the rapid rise is set by the inverse bandwidth of the medium in the absence of the pump field and is therefore dramatically different for a room temperature cell as for a laser cooled sample. We also show that, surprisingly, the slow decay is not dependent on the ground state coherence time, but rather, the interplay between the Rabi frequencies and the excited state spontaneous emission rate. This suggests that, theoretically, the rise time can be made arbitrarily fast, while, simultaneously, the decay time can be made arbitrarily small or even zero. We draw a comparison with experiments performed in a warm cell and in experiments being conducted in a cold sample of atoms. [1] T. Abi-salloum, J.P. Davis, C. Lehman, E. Elliott, F.A. Narducci, *J. Mod. Opt*, **54**, 2459-2471, (2007). [2] V.A. Sautenkov, H. Li, Y.V. Rostovtsev, G.R. Welch, J.P. Davis, F.A. Narducci, M. O. Scully, *J. Mod. Opt*, **55**, 3093-3099, (2008). [3] V.A. Sautenkov, H. Li, Y.V. Rostovtsev, G.R. Welch, J.P. Davis, F.A. Narducci, M.O. Scully, *J. Mod. Opt*, **56**, 975-979, (2009).

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