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Simultaneous EIT of two circularly polarized optical fields driven by a linearly polarized optical field in a ω-system CRISTIAN BAHRIM, Department of Chemistry and Physics, Lamar University — We analyze the possibility of slowing down simultaneously two circularly polarized optical fields using a linearly polarized control field in a four level atom ω-system placed in a weak magnetic field. The goal is to propose a new type of optical quantum memory [1] using binary recording. Our prototype ω-system is an ensemble of alkali-atoms on the $|^1S_0>$ground state and the three M = 0, $\pm$1 Zeeman states of the first excited atomic state, $|^1P_1>$. The energy separation between the Zeeman states is set up with a weak magnetic field of $0.006 < B < 0.035$ T chosen so that (1) the Larmor frequency does not exceed the characteristic time of the spin-orbit interaction between $|^1S_0>$ and $|^1P_1>$ states, and (2) the bandwidths of the $|^1P_1$; M $>$ Zeeman states do not overlap. We report atomic coherences calculated from the density matrix master equation which includes the radiative relaxations $|^1P_1$; M= 0, $\pm$1 $> \rightarrow |^1S_0>$. We explain the mechanism of slowing down simultaneously two optical fields using a variable control field by adopting a dressed state representation. We also analyze the evolution of the Autler-Townes doublets associated to the two probe fields from a proto-EIT phase into a stable EIT phase [2]. [1] Lvovsky A I, Sanders B C and Tittel W 2009 *Nature Photonics* **3** 706. [2] Fleischhauer M, Imamoglu A and Marangos J P 2005 *Rev. Mod. Phys.* **77** 633.

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