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Slow Light Using Electromagnetically Induced Transparency from Spin Coherence in [110] Strained Quantum Wells SHU-WEI CHANG, SHUN-LIEN CHUANG, University of Illinois at Urbana-Champaign, CONNIE J. CHANG-HASNAIN, University of California at Berkeley, HAILIN WANG, University of Oregon — The electromagnetically induced transparency from spin coherence has been proposed in [001] quantum wells recently. [1] The spin coherence is a potential candidate to demonstrate semiconductor-based slow light at room temperature. However, the spin coherence time is not long enough to demonstrate a significant slowdown factor in [001] quantum wells. Further, the required transition of light-hole excitons lies in the absorption of heavy-hole continuum states. The extra dephasing and absorption from these continuum states are drawbacks for slow light. Here, we propose to use [110] strained quantum wells instead of [001] quantum wells. The long spin relaxation time in [110] quantum wells at room temperature, and thus more robust spin coherence, [2] as well as the strain-induced separation [3, 4] of the light-hole exciton transition from the heavy-hole continuum absorption can help to slow down light in quantum wells. [1] T. Li, H. Wang, N. H. Kwong, and R. Binder, Opt. Express 11, 3298 (2003). [2] Y. Ohno, R. Terauchi, T. Adachi, F. Matsukura, and H. Ohno, Phys. Rev. Lett. 83, 4196 (1999). [3] C. Y. P. Chao and S. L. Chuang, Phys. Rev. B 46, 4110 (1992). [4] C. Jagannath, E. S. Koteles, J. Lee, Y. J. Chen, B. S. Elman, and J. Y. Chi, Phys. Rev. B 34, 7027 (1986).

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