Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Controling and Matching Group Velocity of a Bichromatic Field in Double-Double Electromagnetically Induced Transparency[1] HESSA ALOTAIBI, BARRY SANDERS, University of Calgary — Slowing light has valuable applications in optical switching, Quantum optics and optical storage. It also has potential role to enhance the nonlinear response of an optical medium [1], and closely matching group velocities of different pulses can enhance cross-phase modulation [2]. We use temperature-controlled Doppler broadening to control and match group velocities in both transparency windows of a bichromatic probe field in double-double electromagnetically induced transparency [3]. The different dispersion response in the first and second windows to Doppler broadening make it possible to match the group velocity of the probe field in both windows. Our approximate analytical expressions are based on the Lorentzian approximation for group velocity in Doppler-broadened electromagnetically induced transparency, and we validate these expressions by numerical simulation.

[1] L. V. Hau, S. E. Harris, Z. Dutton, and C. H. Behroozi, Nature 397, 594 (1999).
[2] C. Ottaviani, D. Vitali, M. Artoni, F. Cataliotti, and P. Tombesi, Phys. Rev. Lett. 90, 197902 (2003).
[3] H. Alotaibi and B. Sanders, arXiv:1310.3318 [quant-ph](2013)

[1]We acknowledge AITF, CIFAR, PIMS, and NSERC.

Hessa Alotaibi
University of Calgary

Date submitted: 11 Jan 2014 Electronic form version 1.4