Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Fast and Slow Light in a Phase-Sensitive Optical Amplifier NICK BREWER, National Institute of Standards and Technology, Gaithersburg, Maryland, TIAN LI, Texas AM University, College Station, TX, KEVIN JONES, Williams College, Williamstown, Massachusetts, PAUL LETT, National Institute of Standards and Technology, Gaithersburg, Maryland — Phase-sensitive optical amplifiers (PSAs) have the ability to noiselessly amplify and deamplify signals and thus have great potential in both classical and quantum communication. Here we construct a PSA using a double-lambda four-wave mixing scheme on the D1 line of rubidium in a warm vapor cell. An intensity-modulated beam is used as an input to the optical amplifier and the gain and delay of the output is measured. It is found that when the sidebands of the signal are unbalanced the signal develops an apparent advance or delay, similar to fast- and slow-light phenomena. The difference, however, is that the advance or delay depends on the relative phase of all three beams contributing to the four-wave mixing process rather than the optical frequency. It was found that the sidebands of the signal can be systematically imbalanced via misalignment to an optical fiber after the acousto-optic modulator used to modulate the beam. The advance and delay for several different sideband imbalances was measured and found to be consistent with a model of an ideal PSA.

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Date submitted: 30 Jan 2020 Electronic form version 1.4