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All-optical quasi-phase matching of frequency doubling using counterpropagating light[1] RACHEL MYER, ALLISON PENFIELD, ETIENNE GAGNON, AMY LYTLE, Franklin & Marshall College — Nonlinear optical frequency conversion is a useful method for creating coherent light sources with unique capabilities. The main challenge for conversion efficiency of processes like frequency doubling is the chromatic dispersion of the nonlinear medium. Successful techniques for correcting the phase mismatch between the different frequencies are often limited by the type of nonlinear medium that may be used. An all-optical method of quasi-phase matching using counterpropagating light has recently been demonstrated for high-order harmonic generation, an extreme nonlinear process. Sequences of counterpropagating pulses are used to interfere with the harmonic generation process periodically, correcting the phase mismatch and boosting efficiency. We report progress on an experimental investigation of the effect of counterpropagating light on the more commonly used low-order nonlinear optical processes. We present data showing the effects of a single counterpropagating pulse on the efficiency of frequency doubling of a Ti:sapphire ultrafast laser oscillator in beta-Barium Borate.

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