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Robust information storage in warm alkali vapor using slow twisted light: an experiment for the advanced undergraduate laboratory[1]
KEFENG JIANG, KEN DEROSE, LINZHAO ZHUO, JET SETHI, THOMAS LI, SAMIR BALI, Miami University — We endeavor to create an undergraduate-friendly experimental demonstration of slowed and stored twisted light in warm alkali vapor. First, we create slow Gaussian pulses of light propagating at 350 m/s through warm Rubidium gas, and elucidate experimentally the role played by the narrow spectral window of a few kHz due to electromagnetically induced transparency (EIT). The importance of pump intensity optimization is emphasized. Further, by measuring the EIT linewidth as a function of relative pump-probe angle we obtain direct experimental proof of Dicke-narrowing in warm alkali vapor. An application of slow light to the field of quantum information is that now the experimenter supposedly has more time to encode/decode information. However, this also means the stored information has more time available to dissipate away. We describe our experimental progress toward propagating a slow twisted light pulse through warm Rb vapor, showing that the topological stability of the pulse allows for robust storage of information.

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