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Measurement of Excited State Lifetime Using Two-Pulse Photon Echoes in Rubidium Vapor[1] ERIC ROTBERG, SCOTT BEATTIE, IAIN CHAN, BRYNLE BARRETT, ERIC PARADIS, A. KUMARAKRISHNAN, Department of Physics and Astronomy, York University — We have observed two-pulse photon echoes in a Doppler broadened rubidium vapor. The system interacts with traveling wave optical pulses that are ∼20 ns in duration. The pulses are on resonance with the F=3 - F'=4 transition in ^{85}Rb and F=2 - F'=3 transition in ^{87}Rb. They are generated from a CW laser using acousto-optic modulators. The first pulse, occurring at t=0, induces a macroscopic dipole moment that dephases due to atomic motion. The second pulse, occurring at t=T, reverses the direction of the dephasing process so that the echo is formed at t=2T. The echo is detected using a heterodyne technique and its intensity decays exponentially as a function of 2T. We report a measurement of the excited state lifetime precise to ∼1% that is in agreement with a previous measurement. Our results suggest that the excited state lifetime can be determined to a precision of ∼0.25 % by additional data accumulation and by a more comprehensive study of systematic effects.

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