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Experimental study of memory decay in an optically dense EIT medium NATHANIEL PHILLIPS, IRINA NOVIKOVA, College of William and Mary, ALEXEY GORSHKOV, Harvard University — In a typical quantum memory scheme that is based on Slow Light via Electromagnetically Induced Transparency, a strong control field is used to map a weak probe pulse onto a long-lived atomic ground state coherence (i.e., "spin wave"), which is then stored for some time during which all laser fields are turned off. After this storage time, the spin wave is retrieved into a photonic mode by reapplication of a control field. The maximally achieved storage time and efficiency is crippled by the spin wave's decoherence. Theoretically, one can measure the spin wave decay rate by varying the storage time, detecting the retrieved signal field, and computing the exponential decay of the storage efficiency. Experimentally, however, things are more complicated. We perform this measurement in a buffered vapor cell of Rb-87, and investigate parameters that connect the storage efficiency decay rate to the fundamental decoherence rate of the Rb-87 $5^2S_{1/2}$ hyperfine state.

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