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Stored light optimization and optical depth MASON KLEIN, YAN-HONG XIAO, IRINA NOVIKOVA, DAVID PHILLIPS, RONALD WALSWORTH, Harvard-Smithsonian — Efficient storage of light in an atomic ensemble nominally requires a large optical depth to contain an entire light pulse inside the atomic medium without incoherent absorption. In an idealized theoretical picture, very large optical depths should improve the efficiency of stored light. In practice, however, additional effects such as spin-exchange, radiation trapping, and non-linear processes can reduce the efficiency at large optical depths. Here we present an experimental study of stored light efficiency in Rb vapor as a function of optical depth, varying experimental parameters such as pulse duration and shape, storage time, retrieval field intensity, and cell and beam geometry.

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