Study of light storage with Rydberg-state electromagnetically-induced-transparency in cold rubidium atoms

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Employing strong dipole-dipole interaction between the Rydberg-state atoms can greatly enhance the nonlinear susceptibility of photon-photon interaction via the effect of electromagnetically-induced -transparency (EIT). Further enhancement of interaction strength can be achieved with the interaction time being increased during the light storage. We will present our experimental study of light storage with the Rydberg-EIT transition scheme. The transition from the ground state $|5S_{1/2}, F = 2\rangle$ to the intermediate state $|5P_{3/2}, F = 3\rangle$ is driven by a weak probe field, and that from the intermediate state to the Rydberg state $|30D_{5/2}\rangle$ is driven by a strong coupling field. This work is toward the realization of high conversion efficiency from the input probe pulse to the Rydberg coherence.