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Study of forward and diffusely scattered light in ultracold ^{87}Rb under EIT conditions[1] R.G. OLAVE, A.L. WIN, M.D. HAVEY, Physics Dept. Old Dominion University, I.M. SOKOLOV, D.V. KUPRIYANOV, Dept. Theoretical Physics, State Polytechnic University, St. Petersburg — We report a combined experimental and theoretical study of light propagation in ultracold atomic ^{87}Rb vapor under conditions of electromagnetically induced transparency. The main focus is comparison of time-resolved polarized light scattering in forward and in sideways directions. To this end, we use a lambda configuration on the $F = 1 \rightarrow F' = 2 \rightarrow F = 2$ components of the D2 line. Experiments are performed on an ultracold gas sample having a characteristic temperature of 100 μK and typical peak optical depth $b \sim 10$. We observe slowed propagation of forward scattered light, and formation and retrieval of dark state polaritons under a variety of conditions. In the fluorescence geometry we observe behavior complementary to the forward scattering case, and influence, on the time evolution of the scattered light, of the dressing of the atomic medium by the control field. Comprehensive and realistic theoretical treatment of the process is made and compares favorably with the experimental results.

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