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Line shapes in V-type electromagnetically induced transparency for 87Rb atoms: theory and experiment HYUNJONG KANG, HEUNG-RYOUL NOH, Chonnam National University — We present a theoretical and experimental study of electromagnetically induced transparency (EIT) in V-type systems of ^{87}Rb atoms. The probe beam frequency is locked to the $F_g = 2 \rightarrow F_e = 2$ and $F_g = 2 \rightarrow F_e = 1$ transitions of D_1 line and the coupling beam frequency is scanned around the $F_g = 2 \rightarrow F_e = 1,2,3$ transitions of D_2 line. The polarizations of the probe and coupling beams are linear in parallel or perpendicular direction. We calculate accurate line shapes of V-type EIT spectra using density matrix equations by considering all the magnetic sub-levels and compare them with experimental results. To discriminate the contribution of coherence term, we perform similar calculations by ignoring the coherences between the sublevels in the $5P_{1/2}$ state and those in the $5P_{3/2}$ state. We find that the coherence effect is significant only for the cycling transition line.

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