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Relationship between two-and three-photon coherence in a ladder-type atomic system¹ YOON-SEOK LEE, Department of Physics, Pusan National University, HEUNG-RYOUL NOH, Department of Physics, Chonnam National University, HAN SEB MOON, Department of Physics, Pusan National University — We investigated the relationship between two-and three-photon coherence in terms of the transition routes and coupling field intensities in a Doppler-broadened ladder-type atomic system of the $5S_{1/2}$ - $5P_{3/2}$ - $5D_{5/2}$ transition in ^{87}Rb atoms. Three-photon electromagnetically induced absorption (TPEIA) due to three-photon coherence was observed in the only transition route that exhibited a dominant two-photon coherence effect. We showed that two-photon coherence is a necessary condition for three-photon coherence phenomena. A comparison of the relative magnitudes of the electromagnetically induced transparency and TPEIA as a function of the coupling field intensity revealed that three-photon coherence increased twice as rapidly as two-photon coherence. Considering three-photon coherence in a Doppler-broadened ladder-type three-level atomic system, the relation between two-and three-photon coherence was numerically calculated.

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