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Resonances in Four-Level N-Scheme Atomic Systems in the Bare and Dressed States Pictures TONY ABI-SALLOUM, BRYAN HENRY, Physics and Astronomy Dept. Widener University, Chester, PA 19013, JON DAVIS, FRANK NARDUCCI, Naval Air Systems Command, Patuxent River, MD 20670 —
The theoretical study of three resonances that comprise the probe absorption and dispersion lines in the case of four-level N-scheme atomic systems explains the observed behaviors of these systems under different conditions. In this work we derive the three constituent resonances, study their dynamics as a function of the varying strengths of the interacting fields, and match each resonance in both the bare and dressed states pictures with a microscopic pathway that is followed by the system when absorbing a probe photon. The theoretical understanding of the different resonances and their conditions brings clarity to the absorptive versus non-absorptive and slow and fast versus negative group velocities experienced by a probe passing through a four-level N-scheme medium by changing the strengths of the fields.

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