Frequency-Sensitive Optical Response via Tunable Band Structure in an EIT-Based Layered Medium

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Abstract

he optical response of an atomic vapor can be controlled by using tunable quantum interference induced by external control field. A periodic layered medium whose unit cells consist of dielectric and EIT (electromagnetically induced transparency) atomic vapor is suggested. It can be shown that such an EIT-based layered medium shows more flexible optical response (sensitive to frequency) than a conventional photonic crystal. The controllable band structure that depends on the external control field can be applicable to designs of new devices such as photonic switches and photonic logic gates, where one laser field can be controlled by the other one, and would have potential applications in the field of integrated optical circuits and other related areas, e.g., the all-optical technique.

Keyword：Quantum coherence, electromagnetically induced transparency, layered medium, tunable optical behavior