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## Geometric phase of a two-level atom near a dissipative and dispersive dielectric slab

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### Abstract

In this paper, we study the geometric phase of a two-level atom near a dielectric slab. For this purpose, by applying the Von-Neumann equation, we obtain the eigenvalues and eigenvectors of the reduced density operator of the atomic system. Then, we obtain the Lamb shift and transition rates of the atomic system in terms of the electromagnetic Green tensor. Finally, by calculating the electromagnetic Green tensor of the system and making use of the kinematic approach, we study the geometric phase of the atomic system near the dielectric slab. We show that the geometric phase can be used as a sensitive probe to the surface-phonon polariton waves.

**Keywords:** geometric phase, surface polariton-phonon, green tensor, lamb shift and transition rates

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