

Dynamics of Two-Level Trapped Ion in a Standing Wave Laser in Noncommutative Space

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Abstract: We study the dynamics of a two-level trapped ion in a standing wave electromagnetic field in two-dimensional (2D) noncommutative spaces in the Lamb-Dicke regime under the rotating wave approximation. We obtain the explicit analytical expressions for the energy spectra, energy eigenstates, unitary time evolution operator, atomic inversion, and phonon number operators. The Rabi oscillations, the collapse, and revivals in the average atomic inversion and the average phonon number are explicitly shown to contain the information of the parameter of the space noncommutativity, which sheds light on proposing new schemes based on the dynamics of trapped ion to test the noncommutativity.

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Key words: two-level trapped ion, noncommutative space

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