

Correspondence Between Oscillations and Emitted Photon Closed-Orbits in Spontaneous Emission Rate of an Atom Near a Dielectric Slab

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(Received: 2006-10-19; Revised:)

Abstract: We study the oscillations in the spontaneous emission rate of an atom near a dielectric slab. The emission rate is calculated as a function of system size using quantum electrodynamics. It exhibits multi-periodic oscillations. Four frequencies of the oscillations are extracted by Fourier transforms. They agree with actions of photon closed-orbits going away and returning to the atom. These oscillations are explained as manifestations of quantum interference effects between the emitted photon wave near the atom and the returning photon waves travelling along various closed-orbits.

PACS: 32.60.+i, 32.70.Cs, 32.80.Qk, 77.55.+f

Key words: quantum electrodynamics, photon closed-orbit, spontaneous emission, Fourier transform

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