Quantum Physics

Photonic spectrum of bichromatic optical lattices

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We study the photonic spectrum of a one-dimensional optical lattice possessing a double primitive cell, when the atoms are well localized at the lattice minima. While a one-dimensional lattice with a simple Wigner-Seitz cell always possesses a photonic bandgap at the atomic resonance, in this configuration the photonic transmission spectrum may exhibit none, double or multiple photonic bandgaps depending on the ratio between the interparticle distance ϱ inside the cell and the cell size a. The transmission spectra of a weak incident probe are evaluated when the atoms are trapped in free space and inside an optical resonator for realistic experimental parameters.

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