

Time evolution of electromagnetic wave packets through superlattices: Evidence for superluminal velocities

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We study the space-time evolution of electromagnetic wave packets through optical superlattices. We present rigorous analytical solutions describing the multiple-scattering processes of Gaussian wave packets defined in the band gap and in the resonant energy regions. Following their space-time evolution, we obtain the Maxwell equations prediction for the time spent inside the superlattice. From a close and careful observation of the reflected and transmitted parts of Gaussian packets in a photonic band gap, we conclude unambiguously that the superluminal transmission and the Hartman effect are inherent properties of the electromagnetic theory. It is also shown that the theoretical predictions for the time spent inside an optical superlattice are in good agreement with the experimental results and the phase time predictions.

Diakses dari :

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