

434.

Author

Wacker, A (Wacker, Andreas); Bastard, G (Bastard, Gerald); Carosella, F (Carosella, Francesca);
Ferreira, R (Ferreira, Robson); Dupont, E (Dupont, Emmanuel)

Title

Unraveling of free-carrier absorption for terahertz radiation in heterostructures

Source

PHYSICAL REVIEW B, vol.84, no.20, NOV 17 2011, 205319.

Abstract

The relation between free-carrier absorption and intersubband transitions in semiconductor heterostructures is resolved by comparing a sequence of structures. Our numerical and analytical results show how free-carrier absorption evolves from the intersubband transitions in the limit of infinite number of wells with vanishing barrier width. It is explicitly shown that the integral of the absorption over frequency matches the value obtained by the f-sum rule. This shows that a proper treatment of intersubband transitions is fully sufficient to simulate the entire electronic absorption in heterostructure THz devices.