FREE-CARRIER MAGNETOABSORPTION IN QUANTUM WELL STRUCTURES

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S u m m a r y

The theory of free-carrier absorption is developed for a quasi-two-dimensional quantum well in a quantizing magnetic field for the case where the carriers are scattered by polar optical phonons, piezoelectric phonons, and nonpolar optical phonons and the radiation field is polarized perpendicularly to the plane of the layer. The free-carrier absorption coefficients found for the case of a nondegenerate electron gas. The dependence of the evaluated absorption on the magnetic field, thickness of the well, and temperature is shown explicitly. For polar and nonpolar optical phonons, the free-carrier absorption coefficient oscillates as a function of the magnetic field and photon frequency with resonances occurring when $P\omega_c = \Omega \pm \omega_0$, where ω_c, Ω, and ω_0 are the cyclotron, photon, and phonon frequencies, respectively, and where P is an integer. For elastic scattering by piezoelectrical phonons, resonances are expected when $P\omega_c = \Omega$. The obtained results are compared with those of the theory of free-carrier absorption in the absence of a magnetic field.