The density of one-particle states for 2D electron gas in the magnetic field

Illia Dubrovskyi

Institute for Metal Physics, 36 Vernadsky Str., Kyiv 03680, Ukraine
E–mail: dubrovskii@voliacable.com

The density of one-particle electron states per unit energy interval is independent of the energy and of the form of space only as the first term of asymptotic expansion. If the conservation of the zero value of the angular momentum is taken into account, the effective one particle Hamiltonian for a 2D electron gas in a magnetic field is the Hamiltonian with the parabolic potential and the reflecting bounds. The density of one particle states for this Hamiltonian can be described as three energy zones. In the first zone the spectrum is the set of zonules. The distances between centers of zonules equal to $\hbar\omega$ where ω is the cyclotron frequency. The number of states in a zonule is equal to its number. In the second zone the density of states is a piecewise continuous function with distances between jumps that is equal to $\hbar\omega$. In the third zone the density of states is a continuous function that has a maximum and asymptotically tends to the constant from overhead. The bounds between the zones depend on the area of the space and the magnetic field. The Fermi energy of this system is a piecewise continuous function of the magnetic field.