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Theory of the Cyclotron Resonance in Si and Ge SHIGEJI FUJITA, ROBERT SIMION, ROHIT SINGH, University at Buffalo, SUNY, SEIICHI WATANABE, Hokkaido University — A quantum theory is developed for the cyclotron resonance (CR) in silicon(Si) and germanium(Ge). The angular dependent CR peaks for heavy "holes" are analyzed, using the Dresselhaus-Kip- Kittel (DKK) formula: $\omega = (\omega_t^2 cos^2\theta + \omega_t\omega_l sin^2\theta)$, $\omega_t \equiv \frac{eB}{t}$,$\omega_l \equiv \frac{eB}{l}$.Their Fermi surfaces for Si(Ge) are spheroids oriented along $\langle 100 \rangle$ axes with the transverse mass $m_t = 0.46(0.29)m$ and the longitudinal mass $m_l = 1.03(0.78)m$.The fluted energy surfaces represented by the quartic dispersion relations used by DKK were avoided.The CR should be observed only, when a substantial number of conduction electrons with a quadratic dispersion relation resonate at a single frequency.

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