Determination of the electron effective-mass tensor in 4H SiC

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Abstract: Experimental and theoretical results from studies of electron effective masses in 4H SiC are presented. Three principal values of the mass tensor are experimentally resolved by optical detection of cyclotron resonance, and are determined as m(ML)=0.33?0.01m_0, m(M??)=0.58?0.01m_0, and m(MK)=0.31?0.01m_0. These values are in good agreement with m(ML)=0.31m_0, m(M??)=0.57m_0, and m(MK)=0.28m_0, obtained from band-structure calculations based on the local density approximation to the density-functional theory using the linearized augmented plane-wave method. The conduction-band minimum is found to be at the M point of the Brillouin zone.

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