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Strain-induced spin splittings in III-V and II-VI semiconductors

B.J. MOEHLMANN, MICHAEL E. FLATTÉ, OSTC and Department of Physics and Astronomy, University of Iowa — We have calculated the strain-induced spin splittings in III-V and II-VI semiconductors using a fourteen-band basis for a strain-dependent $k \cdot p$ Hamiltonian. Using deformation potentials from pseudopotential calculations we find quantitative agreement with the precessional rates observed in [1]. For GaAs, the contribution of upper-conduction-band deformation potentials to the strain-induced spin splitting is not negligible. The ratio of the strain-induced spin precession frequency to the drift velocity is similar for GaAs and InAs, but is an order of magnitude larger for GaSb and InSb. For ZnSe it is a factor of 2 smaller than GaAs. This work was supported by an ONR MURI. [1] Kato et al., Nature 427, 50 (2004).

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