Abstract Submitted
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Spin-orbit coupling effects in ZB InSb and WZ InAs nanowires using multiband $\mathbf{k}\cdot\mathbf{p}$ method[1] TIAGO CAMPOS, Universidade de São Paulo, PAULO EDUARDO FARIA JUNIOR, MARTIN GMITRA, Regensburg University, GUILHERME MATOS SIPAHI, Universidade de São Paulo, JAROSLAV FABIAN, Regensburg University — We perform comprehensive numerical calculations of spin-orbit effects in semiconductor nanowires. In particular, we focus on zinc-blende InSb and wurtzite InAs semiconductors, and employ realistic $\mathbf{k}\cdot\mathbf{p}$ models fitted to first-principles band structures [1], to obtain spin-orbit spin splittings of the electronic subbands for square, circular, and hexagonal nanowires. In addition to the bulk-inversion asymmetry spin-orbit fields (Dresselhaus in zinc-blende and Rashba in wurtzite phases), we also apply a transverse electric field to induce Rashba spin splittings caused by structure inversion asymmetry. We fit the numerical band structures to symmetry-based effective Hamiltonians and obtain important materials parameters for the lowest subbands, including the spin-orbit spin splitting magnitudes and spin textures. Our work is important in the current research related to Majorana states in semiconductor nanowires. [1] FARIA JUNIOR, P. E. et al. Realistic multiband $\mathbf{k}\cdot\mathbf{p}$ approach from ab initio and spin-orbit coupling effects of InAs and InP in wurtzite phase. Physical Review B 93, 235204 (2016)

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