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Calculations of Spin-orbit Splittings in Two-Dimensional Heterostructures[1] MARTA PRADA, MARK FRIESEN, ROBERT JOYNT, University of Wisconsin-Madison, QUANTUM COMPUTING GROUP TEAM — We present calculations of the of the wave-vector dependent spin-orbit level splittings in GaAs/InGaAs and Si/SiGe quantum wells. We use both an effective mass approach and a numerical tight-binding approach (NEMO-3D) that includes the effects of the interfaces on atomic scales. We are able to separate the Rashba and Dresselhaus contributions. The calculations are done as a function of applied electric field and well width. We find good agreement of theory and experiment for the measurements of L. Meier *et al.*, (Nature Physics **3**, 650 (2007)) on GaAs/InGaAs. In Si/SiGe wells, we find significant valley- spin-orbit mixing and also that the Dresselhaus term is substantial, and can even be larger than the Rashba term for realistic parameters.

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