

Abstract Submitted
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Interface-mediated intervalley coupling in Si¹ BELITA KOILLER, A.L. SARAIVA, Instit. de Fisica, UFRJ, Rio de Janeiro, Brazil, M.J. CALDERON, Instit. de Ciencia de Materiales de Madrid (CSIC), Spain, XUEDONG HU, Dep. of Physics, University at Buffalo-SUNY, S. DAS SARMA, Dep. of Physics, Condensed Matter Theory Center, University of Maryland, College Park, Maryland — The conduction band degeneracy in Si is detrimental to spin qubits, for which a nondegenerate ground orbital state is desirable. The Si valley degeneracy is reduced to 2 near an interface with an insulator, and it may be lifted by the spatially abrupt change in the crystal potential. Basic physical mechanisms for Si/barrier mediated valley coupling in different situations are addressed here. Theoretical studies of the interface-induced valley splitting in Si are presented. Abrupt and smooth interface profiles are considered, and the full plane wave expansions of the Bloch functions at the conduction band minima are included. Simple criteria are suggested for optimal fabrication parameters affecting the valley splitting, emphasizing the relevance of different interface-related properties. Refs: A.L.Saraiva et al, PRB 80, 081305 R (2009); arXiv:1006.3338

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