

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Physical mechanisms for interface-mediated intervalley coupling in Si ANDRE SARAIVA, UFRJ / Univ. of Wisconsin, MARIA CALDERON, Instituto de Ciencia de Materiales de Madrid (CSIC), XUEDONG HU, University at Buffalo, SUNY, SANKAR DAS SARMA, Univ. of Maryland, BELITA KOILLER, Univ. Federal do Rio de Janeiro — The conduction band degeneracy in Si is detrimental to quantum computing based on spin qubits, for which a nondegenerate ground orbital state is desirable. This degeneracy is lifted at an interface with an insulator as the spatially abrupt change in the conduction band minimum leads to intervalley scattering. We present a theoretical study of the interface-induced valley splitting in Si that provides simple criteria for optimal fabrication parameters to maximize this splitting. Our work emphasizes the relevance of different interface-related properties to the valley splitting.

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Date submitted: 19 Nov 2009

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