

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Gate voltage control of exchange interaction for phosphorous donors in silicon.**<sup>1</sup> ANGBO FANG, YIA-CHUNG CHANG, JOHN R. TUCKER, University of Illinois at Urbana-Champaign — We perform realistic calculations for coupled phosphorous donors in silicon delta-doping sheet, which is relevant for silicon-based quantum computation. With the help of generalized unrestricted Hartree-Fock method, we study the influence of valley-orbit interaction on the exchange coupling. We also solve the tunable gate potential by Poisson's equation and study the gate voltage dependence of the exchange splitting. The implications are examined for silicon-based quantum computer architecture, where phosphorous donor electron spin encodes logic qubit and exchange interaction is employed to generate entanglement among qubits.

<sup>1</sup>work supported by DARPA DAAD19-01-1-0324

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Date submitted: 02 Dec 2004

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