

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Phonon-induced decoherence in donor-based charge qubits

FREDY LASTRA, SEBASTIAN REYES, SASCHA WALLENTOWITZ, Pontificia Universidad Catolica de Chile, Santiago, Chile — Solid-state based nanostructures have become in recent years promising candidates for the experimental realization of devices in which quantum information can be processed. In this work we study a particular kind of charge qubits in which the information is stored in the lowest orbital states of an electron shared by a pair dopant ions embedded in a silicon crystal. In particular, we investigate the phonon-driven decoherence and its dependence on temperature. The influence of the inter-ion distance on the decoherence process will also be discussed.

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Date submitted: 20 Nov 2009

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