

Abstract Submitted
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A proposed all-electrical spin qubit CNOT gate robust against charge noise¹ SANKAR DAS SARMA, JASON KESTNER, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, MD — We shall propose an alternative to the Loss-DiVincenzo implementation of the CNOT gate in a quantum dot spin qubit system. Our all-electrical proposal has the advantage of being robust against uncertainties and fluctuations in the tunnel coupling, barrier gate voltage pulse area, and interwell detuning which typically arise due to charge noise. The core idea is to introduce an auxiliary dot and use an analog to the stimulated Raman adiabatic passage (STIRAP) pulse sequence in three-level atomic systems, often referred to in the context of electron transport in quantum dot systems as CTAP (Coherent Tunneling by Adiabatic Passage). Spin-dependent tunneling opens the possibility of performing entangling two-qubit gates by this method.

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