

Abstract Submitted
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Screening of charged impurities with multi-electron singlet-triplet spin qubits in quantum dots¹ JASON KESTNER, EDWIN BARNES, NGA NGUYEN, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland - College Park — Charged impurities in semiconductor quantum dots comprise one of the main obstacles to achieving scalable fabrication and manipulation of singlet-triplet spin qubits. We theoretically show that using dots that contain several electrons each can help to overcome this problem through the screening of the rough and noisy impurity potential by the excess electrons [1]. We demonstrate how the desired screening properties turn on as the number of electrons is increased, and we characterize the properties of a double quantum dot singlet-triplet qubit for small odd numbers of electrons per dot. We show that the sensitivity of the multi-electron qubit to charge noise may be an order of magnitude smaller than that of the two-electron qubit.

[1] E. Barnes, J.P. Kestner, N.T.T. Nguyen, and S. Das Sarma, arXiv:1108.1399.

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