Abstract Submitted
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**Atomistic simulations of multi-valley silicon double quantum dots in the presence of disorder in the few electron regime**[1] RAJIB RAHMAN, ERIK NIELSEN, RICHARD MULLER, MALCOLM CARROLL, Sandia National Laboratories, Albuquerque, NM 87185 — The singlet-triplet based silicon double quantum dot (DQD) is a promising system for implementing a long-lived and controllable quantum bit. The multiple valleys present in silicon, however, may complicate the operation of such a qubit if the valley splitting is small. The valley splitting is affected by a large number of factors including interface roughness, lattice miscuts, electric and magnetic fields, barrier material, and alloy disorder. We employ an atomistic tight-binding (TB) method and a full configuration interaction (CI) to investigate few electron states of a multi-valley Si DQD. This unprecedented approach involving few million atoms allows us to investigate the role of atomic scale disorder (i.e., random alloy effects or interface roughness) on the energy levels and spin configurations of many electron DQDs.

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