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Quantum dot charge stability diagram from a generalized Hubbard model[1] XIN WANG, SHUO YANG, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland — We develop a theory for the charge stability diagram in solid state quantum dot spin qubits using a general form of the Hubbard model. We argue that the extended Hubbard model (with both on-site and inter-site Coulomb repulsion) is the minimal model to describe the system. The appropriate parameters of the Hubbard model can be read off by comparing our theoretically derived results with the experimental charge stability plots. We make predictions on how the charge stability diagram depends on various parameters of the Hubbard model, especially the spin-exchange and hopping energies.

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