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**Impurity effects on coupled quantum dot spin qubits in semiconductors** NGA NGUYEN, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, Maryland 20742-4111, USA — Localized electron spins confined in semiconductor quantum dots are being studied by many groups as possible elementary qubits for solid-state quantum computation. We theoretically consider the effects of having unintentional charged impurities in laterally coupled two-dimensional double (GaAs) quantum dot systems, where each dot contains one or two electrons and a single charged impurity in the presence of an external magnetic field. We calculate the effect of the impurity on the 2-electron energy spectrum of each individual dot as well as on the spectrum of the coupled-double-dot 2-electron system. We find that the singlet-triplet exchange splitting between the two lowest energy states, both for the individual dots and the coupled dot system, depends sensitively on the location of the impurity and its coupling strength (i.e. the effective charge). We comment on the impurity effect in spin qubit operations in the double dot system based on our numerical results. This work is supported by LPS-CMTC and CNAM.

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