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Tunable singlet-triplet splitting in a few-electron Si/SiGe quantum dot ZHAN SHI, University of Wisconsin-Madison, CHRISTIE SIMMONS, Massachusetts Institute of Technology, JONATHAN PRANCE, JOHN GAMBLE, MARK FRIESEN, DONALD SAVAGE, MAX LAGALLY, SUSAN COPPERSMITH, MARK ERIKSSON, University of Wisconsin-Madison — The singlet-triplet energy splitting in a double quantum dot is an important parameter for singlet-triplet qubits, because it determines the energy gap for both initialization and readout. This splitting can also be used to perform gate operations in a newly proposed hybrid qubit [1]. We describe measurements in which we tune the singlet-triplet energy splitting by changing gate voltages on a Si/SiGe double quantum dot [2]. We argue that the energy is changed largely by lateral translation of the dot, which changes the local atomic structure that the electrons experience in the quantum dot, leading to variations in the valley-orbit coupling. We present calculations indicating the experimental results are consistent with the first excited state of the dot having non-zero valley-orbit coupling. [1] Z. Shi, et al., e-print: http://lanl.arxiv.org/abs/1110.6622. [2] Z. Shi, et al., e-print: http://lanl.arxiv.org/abs/1109.0511.

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