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**Mitigation of Small Valley Splitting Effects using Additional Electrons** AARON JONES, HRL Laboratories, LLC — Valley splitting in SiGe quantum dots may be limited due to a variety of effects, including imperfect Si/SiGe interfaces. The primary impact of a small valley splitting is a limited region of bias space at the (2,0)/(1,1) double-dot charge boundary supporting Pauli blockade, impairing singlet triplet measurements as well as the fidelity of singlet initialization. We report on mitigating this problem by operating in the (4,0)/(3,1) charge regime, which fills the lowest valley ground states in the problematic dot. We report that the additional electrons enable the observation of Rabi oscillations in accumulation-mode double- and triple-dot qubits, despite limited valley splitting as evaluated via photon-assisted tunneling (PAT) and measurements of Pauli blockade. We also present theoretical expectations for the influence of orbital states and valley mixing angles when using this methodology to enable qubit control in small-valley-splitting devices.

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