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Statistical benchmarking for orthogonal electrostatic quantum dot qubit devices[1] JOHN GAMBLE, Sandia National Laboratories, ADAM FREES, MARK FRIESEN, S.N. COPPERSMITH, University of Wisconsin-Madison — Quantum dots in semiconductor systems have emerged as attractive candidates for the implementation of quantum information processors because of the promise of scalability, manipulability, and integration with existing classical electronics. A limitation in current devices is that the electrostatic gates used for qubit manipulation exhibit strong cross-capacitance, presenting a barrier for practical scale-up. Here, we introduce a statistical framework for making precise the notion of orthogonality. We apply our method to analyze recently implemented designs at the University of Wisconsin-Madison that exhibit much increased orthogonal control than was previously possible. We then use our statistical modeling to future device designs, providing practical guidelines for devices to have robust control properties.

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