Abstract Submitted
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Reweighting of charge occupation in charge stability diagrams due to finite temperature effect and asymmetric tunnel rates in a silicon MOS double quantum dot[1] KHOI NGUYEN, MICHAEL LILLY, NATHANIEL BISHOP, ERIK NIELSEN, RAJIB RAHMAN[2], JOEL WENDT, JASON DOMINGUEZ, TAMMY PLUYM, JEFF STEVENS, GREG TEN EYCK, MALCOLM CARROLL, Sandia National Laboratories, Albuquerque, NM 87185 — The combination of asymmetric tunnel rates and finite temperature can shift the average charge occupation within a double quantum dot (DQD) stability diagram. DQD charge sensing shows the transitions in electron occupation dependence on gate bias. Applied source-drain bias further introduces shifts in the charge transition lines including the formation of bias triangles. In some material systems, tunnel barrier uniformity can be difficult to achieve. Asymmetry in tunnel barriers can lead to vanishingly small transitions in regions. Finite temperature effects with asymmetric barriers further leads to kinks in the stability diagram. In this talk we present measurements of DQDs with asymmetric barriers and compare them to simulation of stability diagrams using a capacitance network including the rate equation and temperature dependent tunneling. The model provides quantitative insight about finite temperature effects as well as the vanishing charge transition lines that is not readily available in the literature.

[1]Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's NNSA under contract DE-AC04-94AL85000.
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