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Computer assisted design of poly-silicon gated enhancement-mode, lateral double quantum dot devices for quantum computing NATHANIEL BISHOP, RALPH YOUNG, Sandia National Labs, CARLOS BORRAS PINILLA, HAROLD STALFORD, University of Oklahoma, Norman, ERIK NIELSEN, RICHARD MULLER, RAJIB RAHMAN, LISA TRACY, JOEL WENDT, MICHAEL LILLY, MALCOLM CARROLL, Sandia National Labs — We discuss trade-offs of different double quantum dot and charge sensor lay-outs using computer assisted design (CAD). We use primarily a semi-classical model, augmented with a self-consistent configuration interaction method. Although CAD for quantum dots is difficult due to uncontrolled factors (e.g., disorder), different ideal designs can still be compared. Comparisons of simulation and measured dot characteristics, such as capacitance, show that CAD can agree well with experiment for relevant cases. CAD results comparing several different designs will be discussed including a comparison to measurement results from the same designs. Trade-offs between poly-silicon and metal gate lay-outs will also be discussed. This work was performed, in part, at the Center for Integrated Nanotechnologies, a U.S. DOE, Office of Basic Energy Sciences user facility. The work was supported by the Sandia National Laboratories Directed Research and Development Program. 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 National Nuclear Security Administration under contract DE-AC04-94AL85000.

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