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Effect of Stray Charge on Quantum-dot Cellular Automata: A Full-Basis Calculation

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The authors analyze the effect of stray charges near a line of quantum-dot cellular automata (QCA) cells. They present the results of full-basis set calculations for three- and four-cell lines, including the ground state polarization and the excitation energy of the first excited state. A comparison is made between cells with parallel-spin electrons and anti-parallel spin electrons, showing that the added complexity of accounting for the anti-parallel spins is not necessary in this case. Finally, a comparison is made between the full-basis calculations and the results of a similar calculation using the Intercellular Hartree Approximation (ICHA). The similarity between these two results demonstrates that the ICHA method is a valid tool for studying the effect of stray charges in larger systems.

Information about the Author:

Matthew LaRue is a senior electrical engineer at Valparaiso University. Upon graduation, he will pursue a doctorate of electrical engineering degree at Ohio State University, specializing in RF integrated circuits.

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