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Directly accessible entangling gates for capacitively coupled singlet-triplet qubits FERNANDO CALDERON-VARGAS, JASON KESTNER, University of Maryland Baltimore County — In view of recent experimental demonstration of entanglement in capacitively coupled singlet-triplet qubits, we address the open question of what type of entangling gates the system's Hamiltonian can produce directly via a single square pulse. In the analysis we consider the system's Hamiltonian from first principles, incorporating the three different ways in which the system can be biased, and use the representation of its nonlocal properties in terms of local invariants. We find that, in one of the possible biasing modes, the Hamiltonian has an especially simple form, which can directly generate a wide range of different entangling gates including the iSWAP gate. Moreover, using the complete form of the Hamiltonian we find that, for any biasing mode, a CNOT gate can be generated directly [1].

[1] F.A. Calderon-Vargas, J.P. Kestner, "Directly accessible entangling gates for capacitively coupled singlet-triplet qubits," arXiv:1409.6292 (2014).

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