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Quantum logic with cavity-embedded quantum dots using global femtosecond pulses JORDAN KYRIAKIDIS, CATHERINE HOLLOWAY, WAYAN SUDIARTA, Dalhousie University, Halifax, Canada — There are several proposals utilizing quantum dots embedded in optical cavities as physical or logical qubits. The advantage of these systems is that distant qubits can be controllably coupled through virtual cavity modes. Typically, lasers are required to address individual dots in the cavity, which is exceedingly difficult. We present results of our work showing how this potential limitation can be overcome through design of global pulse shapes determined via genetic algorithms. Our results show fast entangling operations on distant qubits with global pulses even for arbitrarily closely-spaced energy levels. This level of quantum control has not yet been been demonstrated for multiple quantum dots embedded in cavities. Our scheme should be implementable with present-day experimental capabilities.

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