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Quantum logic with weakly coupled qubits MICHAEL GELLER, EMILY PRITCHETT, ANDREI GALIAUTDINOV, University of Georgia, JOHN MARTINIS, University of California, Santa Barbara — Effective protocols for performing CNOT quantum logic with qubits coupled by particular high-symmetry (Ising or Heisenberg) interactions are well established. However, many architectures being considered for quantum computation involve qubits or qubits and resonators coupled by more complicated and less symmetric interactions. Here we consider a widely applicable model of weakly but otherwise arbitrarily coupled two-level systems, and use quantum gate design techniques to derive a simple and intuitive CNOT construction. Useful variations and extensions of the solution are given for common special cases.

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