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Quantum vs. Optical Annealing: the Coherent Ising Machine and DWAVE

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We compare the performance of an optical Ising machine built from a network of parametric oscillators to the DWAVE quantum annealer. In the Ising machine, the spin network is represented by a synchronously-pumped fiber OPO that stores 100 pulses, and the Ising Hamiltonian is simulated with a measurement-feedback system, enabling all-to-all connectivity. While the quantum annealer outperforms the Ising machine for sparse graphs, we find that the Ising machine gives significantly better solutions for dense graphs, a fact that may be attributed to the sparse connectivity and embedding overhead of current quantum annealing architectures.