Optimizing for an arbitrary perfect entangler. II. Application

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The difficulty of an optimization task in quantum information science depends on the proper mathematical expression of the physical target. Here we demonstrate the power of optimization functionals targeting an arbitrary perfect two-qubit entangler, which allow generation of a maximally entangled state from some initial product state. We show for two quantum information platforms of current interest, i.e., nitrogen vacancy centers in diamond and superconducting Josephson junctions, that an arbitrary perfect entangler can be reached faster and with higher fidelity than both specific two-qubit gates and local equivalence classes of two-qubit gates. Our results are obtained using two independent optimization approaches, underscoring the critical role of the optimization target.

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