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Quantum multiobservable control RAJ CHAKRABARTI, Princeton University, REBING WU, Tsinghua University, HERSCHEL RABITZ, Princeton University — We present deterministic algorithms for the simultaneous control of an arbitrary number of quantum observables. Unlike optimal control approaches based on cost function optimization, quantum multiobservable tracking control (MOTC) is capable of tracking predetermined homotopic trajectories to target expectation values in the space of multiobservables. The convergence of these algorithms is facilitated by the favorable critical topology of quantum control landscapes. Fundamental properties of quantum multiobservable control landscapes that underlie the efficiency of MOTC, including the multiobservable controllability Gramian, are introduced. The effects of multiple control objectives on the structure and complexity of optimal fields are examined. With minor modifications, the techniques described herein can be applied to general quantum multiobjective control problems.

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