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Constraints for quantum logic arising from conservation laws and field fluctuations JULIO GEA-BANACLOCHE, University of Arkansas, MASANAO OZAWA, Tohoku University, Sendai, Japan — We explore the connections between the constraints on the precision of quantum logical operations that arise from a conservation law, and those arising from quantum field fluctuations. We show that the conservation-law based constraints apply in a number of situations of experimental interest, such as Raman excitations, and atoms in free space interacting with the multimode vacuum. We also show that for these systems, and for states with a sufficiently large photon number, the conservation-law based constraint represents an ultimate limit closely related to the fluctuations in the quantum field phase.

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