Abstract Submitted
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Loss of Cold Atoms from Inelastic Collisions with Large Energy Release[1] ERIC BRAATEN, Ohio State University — Many of the most important loss processes for ultracold atoms involve inelastic collisions with large energy release. The large energy release implies that the loss process is local, so it should be describable by a local rate equation for the number density of the low energy atoms. In few-body physics, the effects of the inelastic collisions on the low-energy atoms can be reproduced by adding a local anti-Hermitian term to the Hamiltonian density. For example, if the inelastic scattering process is a two-atom collision, the anti-Hermitian term is the contact density multiplied by an imaginary constant. If the anti-Hermitian term is included in the time-evolution equation for the density matrix of a many-body system, it predicts a completely wrong time dependence for the number density. This puzzle can be resolved by including an additional term in the evolution equation for the density matrix that transforms it into a Lindblad equation with local Lindblad operators. The Lindblad equation guarantees that the trace of the density matrix is conserved and that its time evolution is Markovian.

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