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## **Thermalization of cold bosons by dynamical heat bath generation**

If and how an isolated quantum system thermalizes despite its unitary time evolution is a long-standing, open problem of many-body physics. We consider a Bose-Einstein condensate (BEC) trapped in a double-well potential with an initial population imbalance. We find that the system thermalizes under certain conditions. With respect to the non-equilibrium dynamics we identify three regimes. After an initial regime of undamped Josephson oscillations, the subsystem of incoherent excitations or quasiparticles (QP) becomes strongly coupled to the BEC subsystem by means of a dynamically generated, parametric resonance. When the energy stored in the QP system reaches its maximum, the number of QPs becomes effectively constant, and the system enters a quasi-hydrodynamic regime where the two subsystems are weakly coupled. In this final regime the BEC acts as a grand-canonical heat reservoir for the QP system (and vice versa), resulting in thermalization. We term this mechanism dynamical bath generation (DBG). We discuss applications of our mechanism to optical lattices and realistic double-well potentials.