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Nonequilibrium States of a Quenched Bose Gas[1] HONG LING, Department of Physics and Astronomy, Rowan University, Glassboro, New Jersey 08080, BEN KAIN, Department of Physics, College of the Holy Cross, Worcester, Massachusetts 01610 — Yin and Radzihovsky [Phys. Rev. A 88, 063611(2014)] recently developed a self-consistent extension of a Bogoliubov theory, in which the condensate number density, n_c, is treated as a mean field that changes with time in order to analyze a JILA experiment by Makotyn et al. [Nature Physics doi:10.1038/nphys2850 (2014)] on a ^{85}Rb Bose gas following a deep quench to a large scattering length. We apply this theory to construct a set of closed equations that highlight the role of dn_c/dt, which is to induce an effective interaction between quasiparticles. We show analytically that such a system supports a steady state characterized by a constant condensate density and a steady but periodically changing momentum distribution, whose time average is described exactly by the generalized Gibbs ensemble. We discuss how the dn_c/dt-induced effective interaction, which cannot be ignored on the grounds of the adiabatic approximation for modes near the gapless Goldstone mode, can affect experimentally measurable quantities such as Tan's contact.

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