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Damping of Collective Oscillations in a Box Trap[1] NICK PROUKAKIS, KEAN LOON LEE, Joint Quantum Centre (JQC) Durham-Newcastle, Newcastle Univ., UK, EUGENE ZAREMBA, Queen's Univ., Kingston, Canada, PATRIK TURZAK, CHRIS EIGEN, ALEX GAUNT, ROB SMITH, ZORAN HADZIBABIC, NIR NAVON, Cavendish Laboratory, Univ. of Cambridge, UK — We model numerically the lowest-lying collective mode of a Bose gas in a box trap excited by a kick in the potential, as in a recent experiment. Our analysis is performed at finite temperatures (below the critical region), based on the so-called ZNG model, in which the condensate is described by a dissipative Gross-Pitaevskii equation which is itself self-consistently coupled to a dynamical thermal cloud described by a quantum Boltzmann equation a model which has proven most successful in describing damping observed in harmonic traps. For typical parameters probed far from the hydrodynamic region, we find a single oscillation – whose frequency agrees well with experiments – with the thermal cloud rapidly damping out higher frequency modes primarily through self-consistent dynamical mean-field coupling. Our results are confirmed by an independent analysis with the stochastic projected Gross-Pitaevskii equation. Intuitively, we find damping in a box trap to depend much more weakly on temperature than in harmonic traps, in broad agreement with experimental data.

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