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Dynamics of Homogeneous Bose Gases TIMON HILKER, JAKE GLIDDEN, CHRISTOPH EIGEN, LENA DOGRA, JINYI ZHANG, University of Cambridge, NIR NAVON, Yale University, ROBERT SMITH, University of Oxford, ZORAN HADZIBABIC, University of Cambridge — Quantum gases are an ideal platform to investigate out-of-equilibrium processes in real time. Using a 3D homogenous Bose gas with tunable interactions, we study effects ranging from density waves in linear response, via purely non-linear damping of the fundamental mode, to far-from-equilibrium processes in strongly driven and quenched systems. In particular, we present our microscopic study of the first and second sound mode in a weakly driven superfluid at finite temperatures and our observation of third-harmonic generation for a strong drive of the fundamental BEC mode. For a longer drive, a turbulent cascade emerges with a universal power-law distribution in quasi-steady-state. Finally, we demonstrate self-similar scaling in space-time by strongly quenching the systems through the BEC transition.

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