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Emergence of a Turbulent Cascade in a Quantum Gas

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The recent realisation of Bose-Einstein condensates in uniform traps [1] has opened interesting possibilities to study far-from-equilibrium phenomena with textbook systems [2]. In this talk, we will present a study where we drive a homogeneous Bose-Einstein condensate (BEC) out of equilibrium with an oscillating force that pumps energy into the system at the largest lengthscale [3]. In the limit of weak drives, the BEC's response is linear, well captured by its lowest-lying excitations. For stronger drives, a nonlinear response is apparent and we observe a gradual development of a cascade characterised by an isotropic power-law distribution in momentum space. We will report on our latest progress on the detailed characterisation of the steady-state turbulent state. [1] A. L. Gaunt et al., Phys. Rev. Lett. 110, 200406 (2013) [2] N. Navon et al., Science 347, 167 (2015) [3] N. Navon et al., Nature 539, 72 (2016)