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Quenching to unitarity: Quantum dynamics in a 3D Bose gas ANDREW SYKES, JOHN CORSON, JOSE D'INCAO, ANDREW KOLLER, JOHN BOHN, ANA MARIA REY, KADEN HAZZARD, JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado 80309-0440, USA, CHRIS GREENE, Dept. of Physics, Purdue University, West Lafayette, Indiana 47907-2036, USA — We study the dynamics of a zero temperature Bose condensate following a sudden quench of the scattering length from noninteracting to unitarity (infinite scattering length). In this talk we discuss how a qualitative understanding of the dynamics can be built up by understanding few-body physics under the same dynamical scenario. We calculate the coherent evolution of the momentum distribution, particularly focusing on the time dependence of the contact. By comparing the results to a many-body mean-field calculation, we gauge the qualitative and quantitative accuracy of this approach. We then discuss the results of a three-body calculation, in which loss dynamics occurs due to three-body recombination. One the key results of this work indicates that loss dynamics takes place over a much longer timescale than the coherent dynamics. This exciting result supports the idea that meta-stable degenerate unitary Bose gases may be experimentally observable in such a non-equilibrium scenario.

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