Abstract Submitted
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Finite-temperature compressibility of disordered lattice bosons at unit filling[1] PHILIP RUSS, University of Illinois at Urbana-Champaign, MI YAN, Virginia Tech, NICHOLAS KOWALSKI, LAURA WADLEIGH, University of Illinois at Urbana-Champaign, VITO SCAROLA, Virginia Tech, BRIAN DEMARCO, University of Illinois at Urbana-Champaign — The disordered Bose-Hubbard model is a paradigm for strongly interacting bosons tunneling between adjacent sites of a disordered crystalline material. A complete picture for the disorder-driven, incompressible–to–compressible Mott-insulator–to–Bose-glass transition (which occurs for simultaneously strong interactions and strong disorder) is not fully understood. To probe this problem, we superimpose a cubic disordered optical lattice potential on Bose-Einstein condensates of ^{87}Rb atoms and measure the core compressibility by observing how disorder affects double occupancy. Our measurements indicate that a remnant of the zero-temperature phase boundary is visible at finite entropy-per-particle. Furthermore, the physics of this transition can be understood using a single-site disordered model, in contrast to the typical description consisting of rare regions in an infinite system.

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Philip Russ
University of Illinois at Urbana-Champaign

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