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Compressibility phase diagram for the disordered Bose-Hubbard model[1] PHILIP RUSS, LAURA WADLEIGH, BRIAN DEMARCO, University of Illinois Urbana-Champaign — Developing a complete understanding of the effects of disorder in quantum many-particle systems is an outstanding problem with key implications for condensed matter physics and quantum information science. We report progress towards this goal in a 3D disordered Bose lattice gas consisting of strongly interacting ^{87}Rb atoms, which realizes the disordered Bose-Hubbard model (DBHM). One of the distinguishing properties of the phases in the DBHM is compressibility. We experimentally map the compressibility of the DBHM phase diagram by measuring the change in double occupancies in the presence of disorder. Further complicating the problem is the introduction of finite temperature, and we explore how compressibility is affected by this additional ingredient.

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