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The superfluid-Mott insulator transition in 2D I. B. SPIELMAN, J. HUCKANS, J. STRABLEY, M. ANDERLINI, J. KRUSE, J. V. PORTO, W. D. PHILLIPS, NIST — Ultra-cold atoms in optical lattices have been exploited to study the Mott-insulator transition in 1, 2, and 3 dimensions; here focus on the 2D Mott-insulator transition. Initially Bose-condensed rubidium atoms are loaded into a 3D optical lattice with an average occupancy of one atom per-site. By making one lattice much deeper in one direction than the remaining two, we construct an ensemble of 2D lattice systems. These 2D systems exhibit a superfluid-insulator transition as the lattice depth is increased. In this talk I present new measurements that show that even when the conventional signature of long-range order (namely diffraction) disappears, the system is not a perfect insulator – partially responding to an impulsive force.

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