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Dynamics of Anti-ferromagnetic Spin Order in Lattice-trapped ^{87}Rb KARL NELSON, RADU CHICIREANU, STEVEN OLMSCHENK, WILLIAM PHILLIPS, TREY PORTO, NIST/JQI — Optical lattices provide a controlled environment in which to model condensed-matter systems and study strongly-correlated many-body behavior. Starting with ^{87}Rb deep in the Mott-insulating state, we use an effective staggered field to create an antiferromagnetically-ordered (AF) many-body state in a double-well optical lattice. In ^{87}Rb, AF order has the highest energy of any $M = 0$ spin configuration in the Mott-insulator state (where M is the total magnetization). Decay from this state requires low-energy excitations that are unavailable due to the Mott-insulator gap. We study the spin dynamics by varying the tunnel coupling in the lattice, to determine how well decay to other spin configurations is suppressed by the Mott-insulator gap.

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