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Experimental Realization of Strong Effective Magnetic Fields in an Optical Lattice[1] YU-AO CHEN, Hefei National Laboratory for Physical Sciences at Microscale and Department of Modern Physics, University of Science and Technology of China, China, MONIKA AIDELSBURGER, MARCOS ATALA, Faculty for Physics, Ludwig-Maximilians-University, Schellingstrasse 4, 80799 Munich, Germany, SYLVAIN NASCIMBENE, Laboratoire Kastler Brossel, CNRS, UPMC, Ecole Normale Superieure, 24 rue Lhomond, 75005 Paris, France, STEFAN TROTZKY, Department of Physics, CQIQC, and Institute for Optical Sciences, University of Toronto, M5S1A7 Canada, IMMANUEL BLOCH, Max-Planck-Institute for Quantum Optics, Hans-Kopfermann-Strasse 1, 85748 Garching, Germany — Ultracold atoms in an optical lattice are promising candidates to study quantum many-body phenomena, such as the integer or fractional quantum Hall effect. Here we report about the experimental realization of strong effective magnetic fields with ultracold atoms using Raman assisted tunneling in an optical superlattice. We studied the nature of the frustrated ground state in the presence of an effective staggered magnetic field from its momentum distribution and directly revealed the quantum cyclotron orbit of a single atom exposed to the magnetic field.

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