

Abstract Submitted
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The Peierls substitution in an engineered lattice potential¹ KARINA JIMENEZ-GARCIA, LINDSAY LEBLANC, ROSS WILLIAMS, MATTHEW BEELER, ABIGAIL PERRY, IAN SPIELMAN, JQI (NIST-Univ. of Maryland) — Artificial gauge fields open new possibilities to realize quantum many-body systems with ultracold atoms, by constructing Hamiltonians usually associated with electronic systems. In the presence of a periodic potential, artificial gauge fields may bring ultracold atoms closer to the quantum Hall regime. Here, we present a one-dimensional lattice derived purely from effective Zeeman-shifts generated by a combination of Raman coupling and radiofrequency magnetic fields. In this lattice the tunneling matrix element is generally complex. We control both the amplitude and the phase of this tunneling parameter, experimentally realizing the Peierls substitution for ultracold neutral atoms.

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