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Topological effects in Floquet-engineered ultracold matter CHRISTOF WEITENBERG, LUCA ASTERIA, HENRIK ZAHN, MARCEL KOSCH, BOJAN HANSEN, KLAUS SENGSTOCK, University of Hamburg — Ultracold atoms in optical lattices constitute a versatile platform to study the fascinating phenomena of gauge fields and topological matter. Periodic driving can induce topological band structures with non-trivial Chern number of the effective Floquet Hamiltonian and paradigmatic models, such as the Haldane model on the honeycomb latticce, can be directly engineered. In recent experiments, we realized new approaches for measuring the Chern number in this system and map out the Haldane phase diagram. This includes time-resolved Bloch-state tomography allowing for the observation of a dynamical linking number after a quench as well as the application of machine learning techniques to analyze experimental data. In the future, the combination of gauge fields with a quantum gas microscope will allow accessing new regimes such as fractional Chern insulators.

Christof Weitenberg
University of Hamburg

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