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Floquet engineering in interacting systems of ultracold Fermions in optical lattices KILIAN SANDHOLZER, FREDERIK GÖRG, MICHAEL MESSER, JOAQUIN MINGUZZI, Institute for Quantum Electronics, ETH Zurich, 8093 Zurich, Switzerland, GREGOR JOTZU, Max Planck Institute for the Structure and Dynamics of Matter, 22761 Hamburg, Germany, REMI DESBUQUOIS, TILMAN ESSLINGER, Institute for Quantum Electronics, ETH Zurich, 8093 Zurich, Switzerland — Periodic modulation is a powerful tool to modify properties of a static system such as opening topological gaps or controlling magnetic order. The versatility of cold atom experiments offers the possibility to implement many of these schemes. Nonetheless, preparing a desired Floquet state in this out-of-equilibrium situation is a more difficult task, especially when the driving frequency is close to a characteristic energy scale of the system. In this work, we prepare fermionic atoms in a driven optical lattice such that the system can be described by two interacting particles on a double well potential with a periodically modulated tilt. We show how to adiabatically prepare and control individual Floquet states. This study is extended to a 3D connected lattice, implementing a driven Fermi-Hubbard model. In the off-resonant case the dynamics of the many-body system can be understood by an effective Hamiltonian which is experimentally observed by directly comparing the driven system to its static counterpart.

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