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Enhancement and sign change of magnetic correlations in a driven quantum many-body system 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 driving can be used to coherently control the properties of a many-body state and to realize new phases which are not accessible in static systems. In this context, cold fermions in optical lattices provide a highly tunable platform to investigate driven many-body systems and additionally offer the prospect of quantitative comparisons to theoretical predictions. We implement a driven Fermi-Hubbard model by periodically modulating a 3D hexagonal lattice. Driving the system near-resonantly to the interaction enables us to independently control the single particle tunneling and the magnetic exchange energy. As a consequence, we are able to show that anti-ferromagnetic correlations in a fermionic many-body system can be enhanced or even switched to ferromagnetic correlations. Furthermore, a detailed study of the dynamics of double occupancies in the driven many-body system gives insights into thermalization, adiabatic preparation and heating.

Kilian Sandholzer
Institute for Quantum Electronics, ETH Zurich, 8093 Zurich, Switzerland

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