Kinetic frustration in ultracold atomic systems: from hole-magnon bound states to kinetic magnetism

Wednesday, 13 September 2023 22:40 (20 minutes)

Kinetic frustration is opening a new paradigm in cold atomic systems, as it induces non-trivial magnetic and spin-charge correlations at temperature scales of the order of the tunneling strength. This phenomenon appears in the strongly interacting regime of doped Fermi- and Bose-Hubbard Hamiltonians in non-bipartite lattices, such as the two-dimensional triangular lattice, and bipartite geometries, such as the square lattice, with a perpendicular magnetic flux. I will discuss how kinetic frustration induces an attractive hole-magnon bound state in the Fermi-Hubbard model and a repulsive hole-magnon bound state in the Bose-Hubbard model in non-bipartite geometries. In the following, I will show how these states can be detected using quantum gas microscopes via static or non-equilibrium probes. In addition, I will discuss how kinetic frustration triggers a magnetic transition in the triangular geometry for the Fermi-Hubbard model and how these magnetic correlations are currently being explored in current cold atom laboratories. Finally, I will discuss the possibility of using spectroscopic techniques to detect hole-magnon bound states in these systems.


Primary author: Dr MORERA NAVARRO, Ivan (University of Barcelona)

Co-author: Prof. DEMLER, Eugene (ETH Zurich)

Presenter: Dr MORERA NAVARRO, Ivan (University of Barcelona)

Session Classification: Poster Session III

Track Classification: Quantum Magnetism