



CRC 1227
Designed Quantum States of Matter



GUEST LECTURE

Assistant Prof. Dr. Luca Barbiero

Department of Applied Science and Technology (DISAT),
Politecnico di Torino, Italy

Leibniz Universität Hannover

DQ-mat Special Colloquium

Wednesday, 11 December 2024, 4.00 pm

Room 267, Appelstr. 2, Building 3701

"Exploring strongly interacting fermionic quantum matter with magnetic atoms"

Strongly interacting fermions in a reduced dimensionality are a key playground for unveiling fascinating states of matter. In this regard, superconductivity and topology represent paradigmatic examples. In this talk, I will show that ultracold magnetic atoms trapped in optical lattice could enable an in depth investigation of these quantum phases. The exceptional versatility offered by this types of particles, makes it indeed possible to design many-body Hamiltonians in the form of generalized t-J models, in which tunable long-range magnetic couplings compete with the onsite interaction and the tunneling processes. Through analytical and numerical analysis, our results demonstrate such complexity to be the responsible for the appearance of a rich phase diagram characterized by different superconducting and symmetry protected topological phases. Notably, these states of matter take place in experimentally accessible regimes and can be probed with standard measurement schemes thus showing the importance of magnetic atoms for a deeper comprehension of strongly interacting quantum matter.

All DQ-mat members and all interested are cordially invited to attend.