



Institut für
Angewandte Physik



Physikalisches
Institut



RHEINISCHE
FRIEDRICH-WILHELMS-UNI-
VERSITÄT BONN

COLLOQUIUM „OPTICS AND CONDENSED MATTER“

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A guided tour through the Fermi-Hubbard model and its relatives via snapshots

In quantum many-body physics, we aim to understand and predict the exciting phenomena emerging from the interactions of many quantum particles. In the regime where numerical simulations become challenging and analytical insights are rare, quantum simulation experiments can provide a possible route to explore these systems. The native measurements of quantum gas microscopes are single site resolved, projective measurements of the quantum many-body state.

A paradigmatic model to study the properties of interacting fermionic particles is the -- conceptually simple -- Fermi-Hubbard model, which is believed to capture many ingredients necessary to describe the physics of the cuprate materials, and has therefore been studied extensively.

In this talk I will use the paradigmatic Fermi-Hubbard model and its relatives, such as the t-J and mixed-dimensional t-J models, as an example to highlight different approaches to gain insights into quantum many-body problems. Snapshots as obtained from quantum simulation experiments provide a new perspective on these models, and allow for the evaluation of completely new observables. I will discuss novel ways to analyze such snapshots, ranging from non-local transformations to perform Hamiltonian reconstruction to machine learning approaches, discussing signatures of pairing, frustration, and stripes along the way.

May 2nd, 16:45 h meet and greet with coffee, 17:15 h, talk live IAP lecture hall or via Zoom

<https://uni-bonn.zoom.us/j/98441612025?pwd=a01SSjlkY1Q3SDFhL09JQk1qc1V6dz09>

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