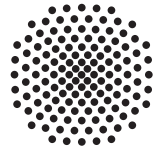


Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung
Fachbereich Physik, Universität Stuttgart

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Hybrid

Name / email address required

Dienstag, 30. Januar 2024

16.15 Uhr

Lecture Hall 2D5

Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Quantum simulation – Engineering & understanding quantum systems atom-by-atom

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Abstract

The computational resources required to describe the full state of a quantum many-body system scale exponentially with the number of constituents. This severely limits our ability to explore and understand the fascinating phenomena of quantum systems using classical algorithms. Quantum simulation offers a potential route to overcome these limitations. The idea is to build a well-controlled quantum system in the lab, which represents the problem of interest and whose properties can be studied by performing controlled measurements. In this talk I will introduce quantum simulators based on neutral atoms that are confined in optical arrays using laser beams. State-of-the-art experiments now generate arrays of several thousand particles, while maintaining control on the level of single atoms. I will show how these systems can be used to study the properties of topological phases of matter and to address fundamental questions regarding the thermalization of isolated quantum systems. In the end I will provide a brief outlook on new directions in the field based on the unique properties of alkaline-earth(-like) atoms.