

Quantum simulation with optical lattices and cavities

Sunday, 10 September 2023 22:40 (20 minutes)

Quantum simulations with neutral atoms offer the unique opportunity to experimentally address outstanding problems in many-body quantum physics. I will report on recent results on the realization and microscopic study of a fractional quantum Hall state in an optical lattice. Our work provides a starting point for exploring other entangled topological matter with ultracold atoms.

Building upon those microscopy techniques, we are currently working to engineer photon-mediated interactions in an array of individually addressable atoms. I will present our progress to build a novel platform with atoms coupled to the field of an optical resonator. Such a system will enable partial non-destructive readout, the generation of multi-particle entanglement, and it offers a path to an efficient atom-photon interface for quantum network applications.

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