# Postdoc or PhD Position
in the Lithium Microscope Team at Hamburg University

## Search for anyonic quasiparticles

In the ERC-funded project ANYON we want to engineer and probe anyonic particles in well-controlled mesoscopic systems of ultracold lithium atoms. Anyons appear, e.g., as quasihole excitations above the Laughlin state in fractional quantum Hall systems, which we want to realize via fast rotation of the external trap. In a recent collaboration with ICFO, Barcelona, we have studied numerically that the preparation of small Bosonic Laughlin states should be feasible when employing large trap anisotropies [1].
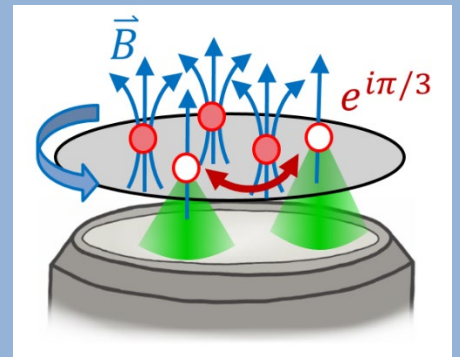
Sketch of a quantum Hall puddle of ultracold atoms with anyonic quasiholes manipulated by repulsive optical tweezers.

Second Generation Quantum Gas Microscopy

The study of strongly-correlated systems requires microscopic access, which we plan to achieve via a novel microscopy concept, which we recently demonstrated with rubidium atoms [2]. It reaches very high resolution by magnifying the distribution via matter wave optics before the optical imaging. In the lithium team, we want to combine the concept with free space fluorescence imaging and our high-NA optical imaging to provide the single-atom sensitive imaging. This will open many new opportunities including the above-mentioned systems.
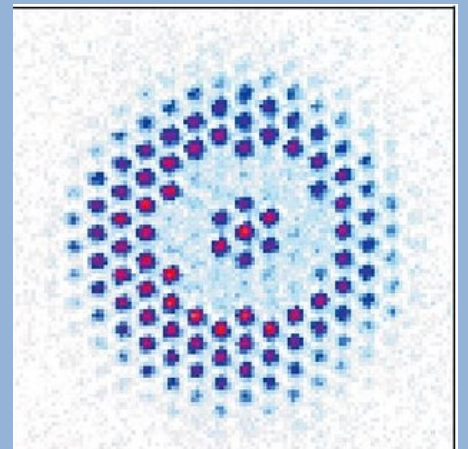
Ultracold atoms in a triangular lattice after removing atoms via magnetic resonance addressing [2].

Contact information

If you are interested in working in a highly-motivated team and in a thrilling research environment in one of Europe's most vibrant cities, please contact:
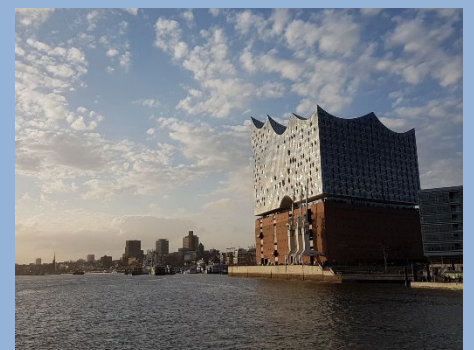
Dr. Christof Weitenberg (cweitenb@physnet.uni-hamburg.de)

References
[1] Barbara Andrade et al., arXiv:2009.08943 (2020).
[2] Luca Asteria et al., arXiv:2104.10089 (2021).
https://www1.physik.uni-hamburg.de/en/ilp/sengstock/research/lithium-microscope.html

The new concert hall Elbphilharmonie located at the Elbe river has become the landmark of Hamburg.