

Physikalisches Kolloquium



Thursday, 13.07.2023, 16:15, HS 100

Reception with coffee & cookies 16:00

(For university staff: please bring your own cup for sustainability reasons)

Prof. Dr. Selim Jochim, Physikalisches Institut,
Heidelberg University:

Collective behavior, atom by atom

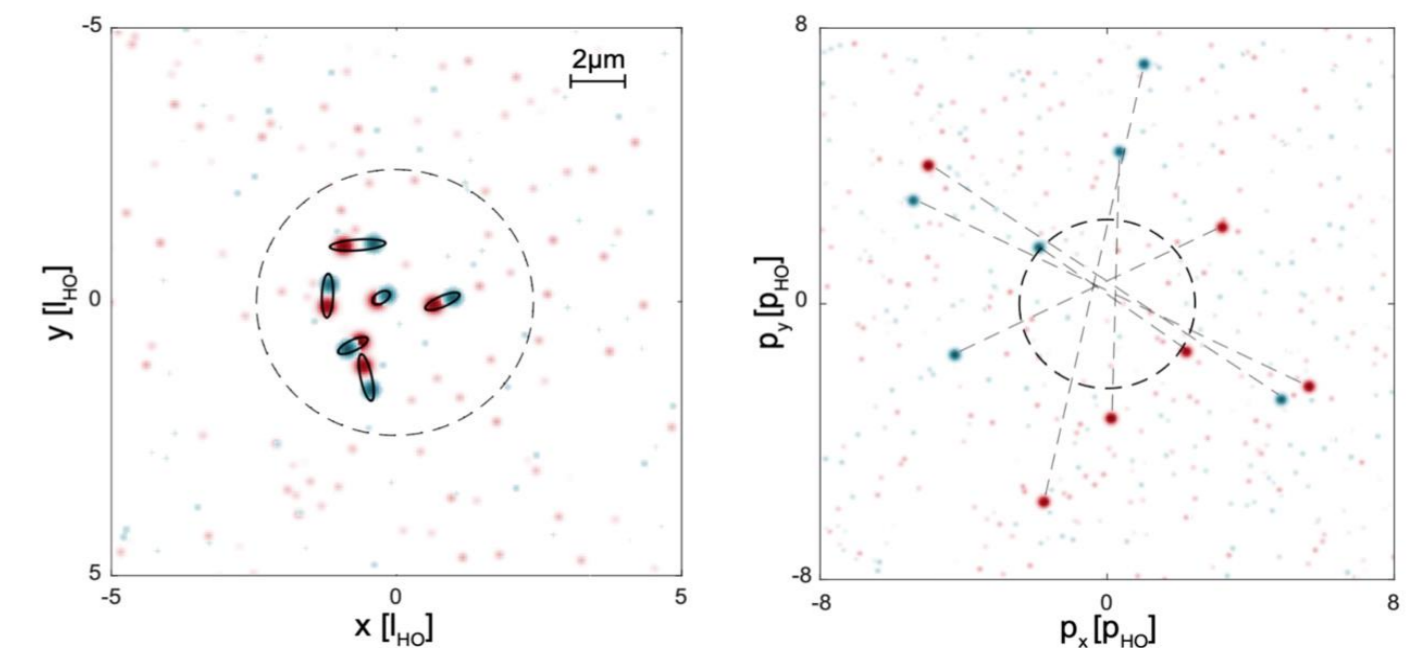
Abstract

Collective behavior is a concept that is usually considered for systems so large that the exact number of constituents doesn't matter. We try to understand how such collectivity emerges from microscopic properties using highly controlled quantum states composed of up to twenty atoms.

The experimental toolbox for our work consists of three major techniques:

- We prepare unique quantum ground states by exploiting Pauli's principle while spilling atoms from a degenerate Fermi gas in an optical tweezer trap.
- To detect these systems we rely on a spin-resolving fluorescence imaging technique that collects a sufficient photon number from individual atoms before they have moved significantly.
- Before detection we apply matter wave optics techniques to magnify or Fourier transform the many particle wave function to obtain positions or momenta of all atoms.

With our experiments, we explore how fluid behavior and a phase transition emerge as a microscopic system is increased in size — atom by atom.



Picture: Snapshots of the wave function of six spin-up and -down atoms that are bound in molecules. Left in real space, right in momentum space.

All of you interested in physics are cordially invited!

Contact: Prof. Dr. J. Mikosch and Prof. Dr. K. Singer, Structural Molecular Dynamics and Experimental Physics I,
More Information: uni-kassel.de/go/physikalisches_kolloquium