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Ultracold trapped Fermi gases and nuclear theory

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Experiments with ultracold trapped atoms offer the possibility to tune, for instance, the density and the interaction strength of a many-body system in a very controlled way. In addition, these systems can be perturbed and analyzed very directly. With these systems, simple theoretical model hamiltonians can be realized experimentally, and the methods of many-body theory applied to these models can be tested. A prominent example is the "unitary Fermi gas", which was first invented as a simple model for low-density neutron matter and which can now be realized in experiment.
In this talk, I will first give an introduction to ultracold trapped atoms, pointing out the analogies but also the differences to nuclear systems. Using the example of collective modes of trapped Fermi gases in the "BCS-BEC crossover", I will show that, on the one hand, the study of trapped atoms can be very fruitful for nuclear theory, and on the other hand, methods developed in nuclear theory are very helpful in describing trapped atoms.

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