Ultracold atomic gases and condensed matter

Mini-colloque .. (*N° du minicolloque – à remplir par l'organisation)*

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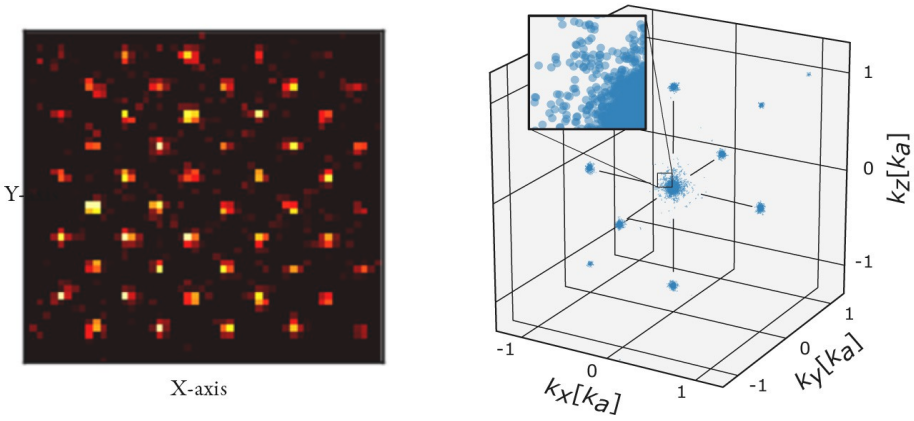
Recent experimental progresses with quantum gases have provided spectacular advances both in the controlled realization of interacting Hamiltonians and in the probing of many-body quantum physics. Examples of shaping microscopic Hamiltonians include lattice structures, disorder, gauge fields and low-dimensional systems in the presence of interactions, whose strength can be tuned for some atomic species. This allows for the implementation of a large variety of microscopic models with ultracold gases. Often inspired by solid-state physics, these models can be viewed as an idealized description of specific many-body Hamiltonians. These progresses are now combined with new and promising probing methods capable of monitoring particle-particle correlations, for instance probes that are sensitive to individual quantum particles. This opens fascinating perspectives for the investigation of quantum correlations in many-body systems.



Left : position-space image of individual Rydberg atoms (Barredo et al., Science 2016)
Right : momentum-space image of individual Helium atoms (Cayla et al., arXiv 2017)

In this mini-colloquium we will focus on ultracold atoms at the interface with condensed matter, putting together both theorists and experimentalists, to explore the different perspectives offered by the interplay of quantum gases and solid-state physics, from the fundamental aspects of quantum many-body systems to the applications for future atom-based devices.