INSTITUT FOR FYSIK OG ASTRONOMI
DET NATURVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

CENTER FOR COMPLEX QUANTUM SYSTEMS

PhD position

Experiments with Strongly Interacting Quantum Systems

Do you want to push quantum physics to new levels in your PhD?

Understanding strongly interacting quantum systems remains one of the central challenges of modern physics. In this PhD project, you will explore such many-body quantum systems by studying mixtures of ultracold atoms at temperatures close to absolute zero.

Our research group experimentally creates and investigates atomic gases at extremely low temperatures, where they form exceptionally clean quantum systems known as Bose–Einstein condensates (BECs). These systems can be probed with unprecedented precision, allowing us to gain deep insights into quantum mechanics in complex many-body settings. This approach—known as quantum simulation—pushes the boundaries of our understanding of quantum matter.

In recent work, we have used BECs of potassium atoms to simulate the behavior of electrons in solids. By embedding a small number of impurity atoms into a condensate, we can emulate key electronic properties. In future experiments, we aim to study strongly interacting impurities with well-defined initial velocities. Their motion will modify the superfluid response of the surrounding BEC, opening up a rich and largely unexplored regime of quantum simulation.

We are seeking an enthusiastic and motivated PhD student to join and strengthen the team in the fall of 2026.

Our offer

The project will make use of state-of-the-art experimental infrastructure and address research questions at the forefront of research. You will carry out experiments in close collaboration with another PhD student and under the guidance of the scientific advisor. The research is embedded in a friendly and stimulating environment within a larger group currently consisting of four PhD students, a senior scientist, and the group leader.

Applicants seeking further information are invited to contact:

Jan Arlt - arlt@phys.au.dk
Deadline: 1/5-2026 for a start on the 1/8-2026
Please contact us well in advance of the deadline!

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