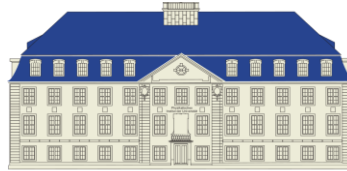




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COLLOQUIUM „OPTICS AND CONDENSED MATTER“

Carrie Weidner

University of Bristol, Bristol UK

Interfacing quantum gas microscopy with DMD-generated potentials: an exploration

The first demonstrations of quantum gas microscopes opened up a new avenue for research in quantum simulation in few- and many-body systems. At Aarhus University, the Rb-87 quantum gas microscope is coupled with the ability to generate near-arbitrary external potentials with digital mirror devices (DMDs) to control the atoms trapped in three-dimensional cubic lattices, including tight, attractive dimple potentials containing approximately 10-100 ultracold atoms. With it, we have demonstrated three-dimensional tomography of the atom distribution [1]. More recently, we have taken some preliminary data to determine the coherence of the atoms trapped in our dimple potentials, as well as demonstrated dimple-based loading of very few lattice sites, which was then used to show basic band-mapping in a 2D system. Finally, we have shown proof-of-principle demonstrations using our DMDs to generate repulsive potentials that prohibit atom tunnelling into certain regions while allowing dynamics in others. In this talk, which will be more of a discussion, I will show some results of the first analyses of this data. If there is time, I will discuss the helicoidal point-spread function work that we are doing here in Bonn and my plans to bring ultracold atoms to the University of Bristol.

[1] O. Eliášson et al. Phys. Rev. A **102**, 053311, (2020)

April 5th, starting with discussion at 16:30 h, talk at 17:15 h, live IAP lecture hall and via Zoom

<https://uni-bonn.zoom.us/j/98441612025?pwd=a01SSjlkY1Q3SDFhL09JQk1qc1V6dz09>

Meeting-ID: 984 4161 2025

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