Local manipulation of 2D Bose gases

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The rapid development of quantum simulation has enabled us to study many-body physics with cold atom experiments in a controlled way, avoiding the computational complexity of solving the problems with classical computers. The introduction of quantum gas microscopes further allows to study the system with single-site resolution in real space. In our experiment, we prepare ultracold two-dimensional 39K Bose gases with the option to image and manipulate using a high resolution microscope objective.

I will present work on the local manipulation of these 2D gases using a digital micromirror device. We aim to compensate for the underlying trapping potential to realize homogeneous Bose-Hubbard models with single atom, single site resolution as well as studying transport physics in homogeneous 2D Bose gases.

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