Stroboscopic fermion tweezer arrays: heating and Hubbard parameters

Hao-Tian Wei, Eduardo Ibarra-García-Padilla, Zoe Z. Yan, ﻿Benjamin M. Spar, ﻿ Max Prichard, Sungjae Chi, Waseem S. Bakr, Kaden R. A. Hazzard

Sorting Category: 06.00 Degenerate gases and many-body physics

Sub-Category: 06.11 FOCUS SESSION: Quantum Computing with Fermionic Arrays

Category Type: Computational

Presentation Type: Oral

The realization of Fermi-Hubbard tweezer arrays with lithium-6 atoms (﻿arXiv:2110.15398) opens a new stage for studying fermionic matter and fermionic quantum computing, where programmable lattice geometries and Hubbard parameters are paired with single-site imaging. Creating useful 2D tweezer arrays requires accurate tuning of individual lattice sites to compensate for disorder, which may be accomplished by using time-averaged potentials of rapidly strobed tweezers. Here we will present calculations for 2D stroboscopic tweezer arrays with a numerically exact discrete variable representation (DVR) methods, and compare results with experimental measurements. In particular, we will describe how heating from the stroboscopic potential depends on strobe frequency, and quantify how stroboscopic potentials modify Hubbard parameters such as the interaction *U* and tunneling *t* in multi-tweezer configurations. Our calculations enable evaluation and optimization of 2D tweezer array experiments.