Numerical Study on a Dynamical Fermi-Hubbard Tweezer Array Configuration

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A realization of Fermi-Hubbard optical tweezer array by Lithium-6 atoms (﻿arXiv:2110.15398) opens up a new stage of simulating and manipulating fermionic quantum many-body models efficiently with great enhancement to dynamical tunability and programmability of lattice geometries and model parameters at the single-site level. Such array configurations, nevertheless, require special techniques to reduce their exceptional sensitivity to disorder, which may introduce possible twist and heating of the original arrays. Here we will present an understanding of single-particle dynamics in the presence of these proposed techniques eg. stroboscopic tweezer trap, mainly based on discrete variable representations (DVR). Our calculations pave a way to propose optimal protocols in experimental applications, as well as further aspects, such as effects of single-site physics in presence of cross interactions when dynamically tuning other single sites.