Abstract:
The ponderomotive force is an effective static force that a particle feels in an oscillating field, whose static potential may be called the ponderomotive potential. We generalize this notion to periodically driven quantum many-body systems, and propose it as a convenient tool to engineer their non-equilibrium steady states beyond the single particle level. Applied to materials driven by light, the ponderomotive potential is intimately related to the equilibrium optical conductivity, which is enhanced close to resonances. We show that the ponderomotive potential from the incident light may be used to induce exciton condensates in semiconductors, to generate attractive interactions leading to superconductivity in certain electron-phonon systems, and to create additional free energy minima in systems with charge/spin/excitonic orders. These effects are presented with experimentally relevant parameters.

Reference: arXiv:2312.04892 (2023)