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Seeking Bose-Einstein condensation in effective Harper-Hofstadter band: simulations of synthetic magnetic field by optical lattice shaking HAN FU, SETIAWAN FNU, LOGAN CLARK, University of Chicago, ANDREAS GLATZ, Argonne National Lab, KATHRYN LEVIN, University of Chicago — The cold atom field has been focused on generating topological and other exotic phases of quantum matter by, for example, creating strong synthetic magnetic fields. The underlying theme of the present work is to use time-dependent Gross-Pitaevskii simulations to make "reality checks" of such schemes. There are several key questions we want to answer: 1. Can one implement shaking effectively so that a BEC would emerge, consistent with the effective energy minima of Bloch-Floquet bandstructure? 2. How realistic is it to experimentally get into the Harper-Hofstadter regime since it may involve extreme parameter values (such as for hopping and shaking frequency)? 3. An important attribute of applying these Bloch-Floquet recipes to cold atoms is that there are easily tunable many-body interactions present, which are necessary for equilibration. There is then an associated question: how much do they undermine the single-particle Floquet band? In this talk we address these issues, and in the process provide advice for experimentalists in implementing these shaking recipes for arriving at a Hofstader BEC. Also, importantly, we try to establish what underlies "heating" and how it is affected by the strength of the interactions g.

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