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Interaction effects in cold gases in synthetic gauge fields[1] THOMAS BILITEWSKI, NIGEL COOPER, T.C.M. Group, Cavendish Laboratory, J.J. Thomson Avenue, Cambridge CB3 0HE, United Kingdom — There has been a long-standing goal to find ways to cause neutral atoms to experience synthetic gauge fields, extending the capabilities of ultracold gases as simulators of quantum many-body systems. Such gauge fields can mimic the effect of magnetic fields and generate topological energy bands. Recent proposals to generate synthetic gauge fields rely on time-dependent periodic forcing of the quantum system.

Interactions are of particular interest in these systems, as the interplay of time dependence and interactions can lead to inelastic scattering and the combined effect of synthetic gauge fields and strong correlations could lead to a variety of novel many body phases of degenerate fermionic or bosonic atoms.

In the framework of Floquet Theory we study the effects of inelastic scattering induced by the intrinsic time dependence of the eigenstates and the elastic two-body interactions [1]. Specifically, we discuss this mechanism as a potential explanation of heating and band population dynamics in current experimental setups.
[1] T. Bilitewski and N. R. Cooper, **Phys. Rev. A** 91, 033601 (2015) & **Phys. Rev. A** 91, 063611 (2015)

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Thomas Bilitewski
T.C.M. Group, Cavendish Laboratory, J.J. Thomson Avenue, Cambridge CB3 0HE, United Kingdom

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