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Optical flux lattices using multi-frequency radiation[1] GEDIMINAS JUZELIUNAS, TOMAS ANDRIJAUSKAS, Vilnius University, Lithuania, IAN SPIELMAN, Joint Quantum Institute, National Institute of Standards and Technology — Ultracold atomic gases are systems exhibiting various condensed matter phenomena. The ultracold atoms are neutral, so under usual circumstance they do not exhibit important magnetic phenomena, like the quantum Hall effect. Possible ways to create artificial magnetic field for ultracold atoms include rotation of an atomic cloud, laser-assisted tunnelling, shaking of optical lattices. Yet it is difficult to reach considerable magnetic fluxes required for achieving the fractional Hall effect. Here we theoretically analyse another way of creating a non-staggered magnetic flux for ultra-cold atoms by using a periodic sequence of short laser pulses providing a multi-frequency perturbation. In particular, we consider a possibility to create a square flux lattice for ultra-cold characterized by two internal states. The energies of the two internal states have opposite gradients in one spatial direction, while the driving consists of periodic in time pulses that couple the internal states and propagate in a direction perpendicular to the energy gradient. The time-depending perturbation effectively creates a square optical lattice affected by a non-staggered magnetic flux. The topological properties of such a lattice have been explored.

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