Abstract Submitted
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Realization of uniform synthetic magnetic fields by periodically shaking an optical square lattice[1] FERNANDO SOLS, CHARLES E. CREFFIELD, GREGOR PIEPLOW, Universidad Complutense de Madrid (Spain), NATHAN GOLDMAN, Universite Libre de Bruxelles (Belgium) — Shaking a lattice system, by modulating the location of its sites periodically in time, is a powerful method to create effective magnetic fields in engineered quantum systems, such as cold gases trapped in optical lattices. However, such schemes are typically associated with space-dependent effective masses (tunneling amplitudes) and non-uniform flux patterns. In this work [1] we investigate this phenomenon theoretically, by computing the effective Hamiltonians and quasienergy spectra associated with several kinds of lattice-shaking protocols. A detailed comparison with a method based on moving lattices, which are added on top of a main static optical lattice, is provided. This study allows the identification of novel shaking schemes, which simultaneously provide uniform effective mass and magnetic flux, with direct implications for cold-atom experiments and photonics. [1] C. E. Creffield, G. Pieplow, F. Sols, N. Goldman, New J. Phys. 18, 093013 (2016).

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