Abstract Submitted
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Realization of Bose-Einstein condensation in higher Bloch bands of an optical honeycomb lattice[1] TOBIAS KLAFKA, ALEXANDER ILIN, JULIUS SEEGER, PHILLIP GROSS, KLAUS SENGSTOCK, JULIETTE SIMONET, University of Hamburg, Germany — Bose-Einstein condensates in higher Bloch bands of optical lattices immensely extend the possibilities for quantum simulation of solid state models. Unconventional superfluids and new topological states of matter are expected to emerge from the interplay of spin and orbital degrees of freedom as well as the lattice symmetry. We report on Bose-Einstein condensation in the second and fourth band of a bipartite honeycomb lattice. Tuning the energy offset between the two sublattices allows a controlled transfer to higher bands. We have investigated the emergence of coherence for these metastable states as well as the interplay of band relaxation dynamics and condensation by tracing the dynamics in the Brillouin zones. Understanding these non-equilibrium processes constitutes an essential requirement for the stabilization of unconventional spinor condensates in higher bands.

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