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Bogoliubov theory of interacting bosons on a lattice in a synthetic magnetic field STEPHEN POWELL, RYAN BARNETT, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, RAJDEEP SENSARMA, Condensed Matter Theory Center, University of Maryland, SANKAR DAS SARMA, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland — We present a theoretical study of the effect of a magnetic field on a bosonic superfluid in a tight-binding lattice, motivated by advances in the synthesis of gauge potentials for ultracold atoms. An analysis based on the magnetic symmetry group shows that the superfluid has simultaneous spatial order, and that this depends on commensuration between the magnetic field and lattice. We predict clear signatures of many-body effects in time-of-flight images, and use a Bogoliubov expansion to calculate quasiparticle spectra that may be measured using Bragg spectroscopy. This work has been supported by JQI-NSF-PFC, ARO-DARPA-OLE, and Atomtronics-ARO-MURI.

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