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Bosons with Synthetic Rashba Spin-Orbit Coupling at Finite Power[1] BRANDON ANDERSON, CHARLES CLARK, JQI, UMD and NIST — Isotropic spin-orbit couplings, such as Rashba in two dimensions, have a continuous symmetry that produces a large degeneracy in the momentum-space dispersion. This degeneracy leads to an enhanced density-of-states, producing novel phases in systems of bosonic atoms. This model is idealistic, however, in that the symmetry of the lasers will weakly break the continuous symmetry to a discrete one in experimental manifestations. This perturbation typically scales inversely with the optical power, and only at infinite power will ideal symmetry be restored. In this talk, we consider the effects of this weak symmetry breaking in a system of bosons at finite power with synthetic Rashba coupling. We solve the mean-field equations and find new phases, such as a stripe phase with a larger symmetry group. We then consider the experimentally relevant scheme where the spin-orbit fields are turned on adiabatically from an initial spin-polarized state. At intermediate power, stripe phases are found, while at sufficiently high power it appears that the system quenches to phases similar to that of the ideal limit. Techniques for optimizing the adiabatic ramping sequence are discussed.

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