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Vortices of Lattice Bosons Acquire Spin and Fermi Statistics
ASSA AUERBACH, NETANEL LINDNER, Physics Department, Technion, Israel, DANIEL AROVAS, University of California at San Diego — Lattice bosons a respond differently to a magnetic field, or a rotation, than continuum bosons, e.g. their Hall conductivity is not a linear function of their density. Such effects are mostly pronounced for hard-core bosons at half filling. For a periodic lattice on a torus threaded by fluxes, we can explicitly construct a conserved SU(2) 'vortex spin' algebra. For odd total vorticity, even-fold spectral degeneracies are discovered on every lattice site. In particular, *the single vortex has spin half*. The vortex effective mass and spin-orbit coupling are extracted by diagonalizing the Hamiltonian on a 4x4 lattice. For two vortices, numerical 'vortex-spin' correlations and orbital symmetries are consistent with Fermi and not Bose statistics. We discuss implications of the our results on the 'vortex metal' phase at large magnetic fields.

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