Quantum Properties of Vortices of Two-Dimensional Continuum and Lattice Bosons

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Abstract. Vortex dynamics at low temperatures is derived for two bosonic systems: A weakly interacting gas with localized pinning sites, and hard core bosons on a square lattice at half filling. The effective tunneling rate, or lattice mass, is extracted. Vortex tunneling, and consequently signatures of variable range hopping transport is expected in parameter disordered cuprate films. The vortex lattice quantum melting density is estimated. For the half filled hard core bosons, each vortex is shown to carry an effective spin half.

REFERENCES

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