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2D Vortex Dynamics and Quantum Tunneling in the Lowest Landau Level Limit ROHIT HEGDE, Department of Physics, University of Texas at Austin, CHARLES B. HANNA, Department of Physics, Boise State University, ALLAN H. MACDONALD, Department of Physics, University of Texas at Austin —
We examine the collective excitation spectrum of a rapidly rotating cold Bose gas in the lowest Landau level regime. The Gross-Pitaevskii action can be equivalently expressed in terms of the angular momentum state expansion of the boson field or in terms of 2D vortex positions. We emphasize the very different role of visible and invisible vortices in the latter formulation and discuss the significance of non-standard non-local Berry phase coupling between separated vortices in the boson action. We also consider dissipative quantum tunneling of a single vortex, allowing for linear coupling to a bath of quadratic fluctuations of the lattice following the Caldeira-Leggett model, and comment on differences between the lowest Landau level limit and the case of vortices in a slowly rotating superfluid.

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