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Non-analytic Vortex Core and Nonlinear Vortex Flow in Bosonic Superfluids

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Abstract:

Vortices in bosonic superfluids with large healing length undergo a non-analytic core reconstruction which results in a set of low energy excited states with long lifetime [see Prof. Aleiner's lecture]. We analyze the disordered limited motion of such vortices and show that vortex heating results in strong nonlinear effects of the transport at velocities much smaller than Landau's critical velocity. Experiments are suggested to verify our predictions.