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**Superfluid Stiffness of a
Driven Dissipative Condensate with Disorder**

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Abstract:

Observations of macroscopic quantum coherence in driven systems, e.g. polariton condensates, have strongly stimulated experimental as well as theoretical efforts during the last decade. We address the question of whether a driven quantum condensate is a superfluid, allowing for the effects of disorder and its non-equilibrium nature. We predict that for spatial dimensions $d < 4$ the superfluid stiffness vanishes once the condensate exceeds a critical size, and treat in detail the case $d = 2$. Thus a non-equilibrium condensate is not a superfluid in the thermodynamic limit, even for weak disorder, although superfluid behavior would persist in small systems.