Abstract Submitted
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Stability of Counterflow Superfluidity[1] NOAH BRAY-ALI, CARL WILLIAMS, Joint Quantum Institute, NIST and University of Maryland, 100 Bureau Drive, Stop 8423, Gaithersburg, MD 20899-8423, USA, EUGENE DEMLER, Department of Physics, Harvard University, Cambridge MA 02138 — We examine the stability of the counterflow superfluid state in two component mixtures of ultracold atoms in optical lattices. Using a Gutzwiller mean-field approach, we find a sharp boundary separating stable counterflow from a dynamically unstable regime. As the inter-component interaction strength increases, the critical counterflow rate drops, falling to zero when interactions are strong enough to induce phase separation of the two components. Going beyond mean-field theory, we compute the decay rate of counterflow within the stable regime due to phase slips. The results agree well with numerically exact simulations and are calculated in a regime of parameters relevant to current experiments on mixtures of ultracold alkali atoms.

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