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Preemptive phase-transitions in multicomponent BECs[1] STEINAR KRAGSET[2], Norw. Univ. of Sci & Tech, ESKIL KULSET DAHL, Norw Univ. of Sci & Tech, EGOR BABAEV, University of Massachusetts Amherst, ASLE SUDBO, Norw Univ of Sci & Tech —
We use analytical arguments and large-scale Monte-Carlo simulations to investigate phase transitions between various complex superfluid phases in a two-component Bose-Einstein condensate with varying non- dissipative drag between the two components. We focus on establishing the phase- diagram and investigate in detail the individual and composite superfluid densities that the system features, using a representation in terms of the phases of the superfluid ordering fields. In particular, we describe a novel preemptive scenario, whereby drag induces a first-order phase transition from the interplay between two phase-transitions that individually would have been in the $3DXY$-universality class. Our results may shed light on similar phenomena occuring in certain multicomponent superconductors and in scenarios of deconfined quantum criticality in certain quantum antiferromagnetic systems.

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