

Abstract Submitted
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Phase transitions in a three dimensional $U(1) \times U(1)$ lattice London superconductor: Metallic superfluid and charge-4e superconducting states¹ EGIL HERLAND, Norwegian University of Science and Technology, EGOR BABAEV, Amherst University, ASLE SUDBO, Norwegian University of Science and Technology — We consider a three-dimensional lattice $U(1) \times U(1)$ and $[U(1)]^N$ superconductors in the London limit, with individually conserved condensates. The $U(1) \times U(1)$ problem, generically, has two types of intercomponent interactions of different characters. First, the condensates are interacting via a minimal coupling to the same fluctuating gauge field. A second type of coupling is the direct dissipationless drag represented by a local intercomponent current-current coupling. We study phase transitions and two types of competing paired phases which occur: (i) a metallic superfluid phase, (ii) a composite superconducting phase where there is order in the phase sum of the order parameters which has many properties of a single-component superconductor but with a doubled value of electric charge.

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