

Abstract Submitted
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Is SmB₆ a failed superconductor? Part I: long-wave length action¹

ONUR ERTEN, Max Planck Institute for the Physics of Complex Systems, PO-YAO CHANG, PIERS COLEMAN, Rutgers University, ALEXEI TSVELIK, Brookhaven National Laboratory — The theory of superfluids and superconductors is founded on London’s idea of “wavefunction rigidity”, in which gradients of the condensate phase carry a persistent superflow. However, the theory of neutral superfluids reveals that a stable superflow also requires the topological quantization of circulation: when this is absent, as in the case of ³He-A, the superflow is unstable. Motivated with the controversial experimental results on SmB₆, we generalize this idea to charged superfluids, in which a higher dimensional order parameter manifold topologically destabilizes vortices, causing the rapid decay of supercurrents into a novel diamagnetic insulator. I will present a Ginzburg-Landau type long wavelength action of a ‘failed’ superconductor and discuss how supercurrents decay through formation of space-time skyrmions. This work is done in collaboration with Po-Yao Chang, Piers Coleman and Alexei M. Tsvelik.

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