

Abstract Submitted  
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**Is SmB<sub>6</sub> a failed superconductor? Part III: Experimental Consequences**<sup>1</sup> PIERS COLEMAN, Center for Materials Theory, Rutgers University, ONUR ERTEN, Max Planck Institute for Complex Systems, Dresden, PO-YAO CHANG, Center for Materials Theory, Rutgers University, ALEXEI TSVELIK, Division of Condensed Matter Physics and Material Science, Brookhaven National Laboratory — I will discuss how the idea of *failed superconductivity* can be applied to the anomalous bulk properties of SmB<sub>6</sub>, focusing on experimental consequences of this idea. While transport and ARPES measurements provide evidence of metallic surface states with an insulating bulk, specific heat, thermal/optical transport and quantum oscillations suggest the bulk *hosts gapless neutral excitations*. We argue that these paradoxes can be understood as a result of a broken gauge invariance, restored at long distances by the macroscopic failure of the superconducting state. In particular, I shall discuss how the observation of a linear-in-field thermal conductivity[1] can be understood as the result of a skyrmion fluid within a failed superconductor[2,3,4], and provide various predictions for the low field physics and spectroscopy that can be used to test this idea.

[1] S. Sebastian et al, SCES 2016, Hangzhou.

[2] P. Coleman, E. Miranda and A. Tsvelik, Physica B: Cond. Matt., 186-188, 362 (1993).

[3] G. Baskaran, arXiv 1507.03477

[4] O. Erten, P.-Y. Chang, P. Coleman, A. Tsvelik, preprint (2016)

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