

Abstract Submitted
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Is SmB₆ a failed superconductor? — Part II: a microscopic model¹ PO-YAO CHANG, Center for Materials Theory, Rutgers University, ONUR ERTEN, Max Planck Institute for the Physics of Complex Systems, PIERS COLEMAN, Center for Materials Theory, Rutgers University, ALEXEI TSVELIK, Division of Condensed Matter Physics and Material Science, Brookhaven National Laboratory — Heavy fermion materials provide a natural playground for extending our current understanding of topological phases of matter in the presence of strong correlations. In this talk, we would like to present a microscopic model of failed superconductivity in heavy fermion systems and its application to SmB₆. The essential part of the microscopic model is a Majorana representation of impurities in the Kondo lattices. We demonstrate a composite order parameter in this model cannot sustain stable supercurrent. In the mean-field level, we show a gapless Majorana Fermi sea emerges and is decoupled from impurities. We observe mirror symmetry protected surface states coexist with a bulk gapless Majorana Fermi sea. We establish the existence of a gapless Majorana Fermi sea may potentially resolve mysterious issues of quantum oscillation measurements in SmB₆. This work is done in collaboration with Onur Erten, Piers Coleman and Alexei M. Tsvelik.

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Po-Yao Chang
Rutgers Univ

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