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Filling Enforced Semimetals and Fractionalized Phases in Nonsymmorphic Kondo Lattices[1] BRETT BRANDOM, Univ of California - Irvine, J.H. PIXLEY, University of Maryland, SUNGBIN LEE, Korea Advanced Institute of Science and Technology, S.A. PARAMESWARAN, Univ of California - Irvine — The competition between frustrated magnetic exchange interactions and Kondo screening in heavy-fermion systems can lead to phase transitions that involve a change in the volume of the Fermi surface. Remarkably, such transitions can be continuous and are consistent with Luttingers theorem as long as the local moments are included in the Luttinger count. In such a scenario, in the screened phase, local moments and conduction electrons combine into a large Fermi sea of heavy electrons. When exchange dominates screening, but magnetic order is frustrated, this can give way to a fractionalized Fermi liquid: local moments form a spin liquid described at low energies by a deconfined gauge theory with exotic, fractionalized excitations, while the conduction electrons fill a small Fermi sea. We complement this picture by applying a recent extension of Luttingers theorem that incorporates crystal symmetries, and show that the presence of nonsymmorphic symmetries enriches the small-large Fermi surface transition in a manner that cannot be gleaned from Luttingers theorem alone. In particular we discuss filling-enforced semimetallic behavior on either side of the transition and how nonsymmorphic symmetries stabilize these phases from opening up a gap.

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