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Magnetic Frustration in the Shastry-Sutherland Kondo lattice and the Global Phase Diagram of Heavy Fermion Metals

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Over the past decade there has been significant theoretical and experimental progress in our understanding of antiferromagnetic quantum critical heavy fermion metals [1]. Recent years have seen a surge of studies on heavy fermion compounds with local moments that reside on geometrically frustrated lattices, which may host entirely new types of quantum critical points [2]. With a particular emphasis on Yb_2Pt_2Pb [3] and related 221 systems [4,5], we consider the Shastry-Sutherland Kondo lattice [6]. We determine the zero temperature phase diagram as a function of magnetic frustration and Kondo coupling. We study the transition between the valence bond solid phase of the Shastry-Sutherland lattice and a heavy fermi liquid, and find a phase diagram remarkably similar to the theoretically proposed global phase diagram of heavy fermion metals. We discuss the implications of our results for other geometrically frustrated heavy fermion metals.

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