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Skyrmion defects of antiferromagnet and competing singlet orders of a Kondo-Heisenberg model on honeycomb lattice CHIA-CHUAN LIU, Rice Univ, PALLAB GOSWAMI, University of Maryland, QIMIAO SI, Rice Univ — The competition between antiferromagnetism and proximate singlet orders is the common feature of many heavy fermion compounds. Depending on the context, the singlet order can be described by static Kondo singlets, unconventional superconductivity, site or bond centered charge orders, or more exotic density waves. This competition between singlet and triplet orders can give rise to exotic quantum critical points or even an intervening non-Fermi liquid phase. It is a fundamentally important but challenging problem to develop a general scheme for identifying the competing singlet orders from the antiferromagnetically ordered side and vice versa. We study this problem on a honeycomb lattice, and approach it starting from the Kondo-destroyed antiferromagnetic phase. We show how the topological defects of the antiferromagnetic order parameter can give rise to competing singlet orders in the presence of itinerant fermions. We identify translational symmetry breaking singlet orders and static Kondo singlets as gapped collective excitations inside the skyrmion core. Our results provide non-perturbative insight into the global phase diagram of heavy fermion compounds.

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