Phase diagram of half-filled $J_1 - J_2$-Heisenberg Kondo lattice model on honeycomb lattice[1] QIMIAO SI, Rice University, PALLAB GOSWAMI, National High Magnetic Field Laboratory and Florida State University — Recent studies in quantum critical heavy fermion metals have opened up a rich phase diagram. The zero-temperature global phase diagram involves a combination of phases, featuring Kondo screening/destruction and antiferromagnetic order/disorder as the quantum fluctuations of the local moments are tuned relative to their Kondo coupling with the spins of the conduction electrons. Recently, we have studied a one-dimensional Heisenberg-Kondo model to reveal a competition between a Kondo-screened paramagnetic phase with a large Fermi surface and a Kondo-destroyed paramagnetic spin-Peierls phase with a small Fermi surface [1]. To take advantage of the intuitions gained through that work, we study here a half-filled, $J_1 - J_2$ Heisenberg-Kondo lattice model on a honeycomb lattice. We have obtained a rich phase diagram as a function of magnetic frustration and Kondo coupling. Apart from antiferromagnetic and Kondo insulators, we also find Kondo-destroyed phases that are semimetallic with Fermi points. There are also particular critical points which are gapless in both charge and spin sectors.

[1] P. Goswami and Q. Si, Phys. Rev. Lett. **107**, 126404 (2011).

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