

Kondo Lattice Systems and Reconsideration of the Doniach Phase Diagram

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A major challenge has been to understand the limits of applicability of the standard model of the metallic state and to identify fruitful areas for the search for novel conducting quantum liquids. Of particular interest are coupled conduction-electron and localized-electron systems usually treated in terms of the Periodic Anderson or Kondo Lattice models. The lecture will re-examine the Pines-Yang two-fluid description of such systems for the normal, magnetic and superconducting states. The description has been helpful in the classification of experimental data and, in particular, has uncovered striking departures from the expectations of the traditional Doniach phase diagram. We consider possible interpretations of the two-fluid phenomenology with reference to recent microscopic treatments of the Periodic Anderson or Kondo Lattice models to help guide further experimental research in this field.

References:

- [1] Y.-f. Yang & D. Pines, PNAS **109** E3060 (2012); G. G. Lonzarich, PNAS **109** 18241 (2012); and references cited therein.
- [2] G. G. Lonzarich, Y.-f. Yang & D. Pines, Reports on Progress in Physics, **80**, 024501 (2017).