

Abstract Submitted
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Doniach Diagram in Disordered Electrons System¹ HYUNYONG

LEE, Division of Advanced Materials Science, Pohang University of Science and Technology (POSTECH), Pohang 790-784, South Korea, STEFAN KETTEMANN, School of Engineering and Science, Jacobs University Bremen, Bremen 28759, Germany — We have derived the quantum phase diagram of disordered electron systems with magnetic impurities. The competition between RKKY interaction, J_{RKKY} , and Kondo effect gives rise to a rich quantum phase diagram, or Doniach diagram. We present numerical results for disordered 2D electron systems which show that both Kondo temperature, T_K and J_{RKKY} are widely distributed and quantum critical point is extended to a critical region. We find a sharp cutoff in the distribution of their ratio, J_{RKKY}/T_K , and from that critical density of magnetic impurity below which Kondo always wins. We find that the spin coupled phase grows at the expense of Kondo phase as increasing disorder. The spin coupled phase shows a succession of 3 phases: 1. a Griffiths phase with anomalous power laws determined by distribution of J_{RKKY} , 2. spin glass phase, 3. long range magnetic ordered phase. We report the results on graphene where we find that spin coupled phase is more stable against Kondo screening, but is more easily destroyed by disorder into a paramagnetic phase [1].

[1] H. Lee, S. Kettmann, arXiv:1211.1734(2012)

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