

# Kondo-Anderson Transitions

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Abstract:

At the disorder driven Anderson metal-insulator transition (AMIT) the eigenstates are well known to develop multifractal fluctuations. Their properties are intermediate between being extended and localized. There is both numerical and experimental evidence for multifractality in a wide range of disordered materials.

Recently, it has been found experimentally that electron systems close to the AMIT, such as Si:P, exhibit non-Fermi liquid behavior.

In the present work we show analytically that dilute magnetic impurities which are interacting with electrons in multifractal states result in a universal power law divergence of their magnetic susceptibility. This behavior is related to the emergence of local pseudogaps due to multifractal power law correlations.

The interplay between the Kondo effect and the Anderson metal-insulator transition is furthermore found to result in a new critical semimetal phase. At finite temperature new types of phase transitions appear, which one may name Kondo-Anderson transitions (KATs), accordingly. We compare these results with experiments on the AMIT with local magnetic moments, in particular on Si:P.

Kettemann, E. R. Mucciolo, and I. Varga, Phys. Rev. Lett. **103**, 126401 (2009), and subm. to PRB (2011).