High pressure transport and AC calorimetric studies of some correlated electron systems

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Some recent results are presented:

1) For the first time, the specific-heat anomaly in the overdoped range of a single crystal of the high-temperature superconductor $YBa_2Cu_3O_7$ has been studied under high pressure, up to 10 GPa, using AC calorimetry. The evolution of the specific-heat jump, as well as the bulk T_c, are consistent with a pressure-induced increase of the charge-carrier concentration n_h by about 0.02.

2) The pressure range of the non-Fermi liquid (NFL) region of MnSi has been investigated by resistivity. In contrast with predictions of the current model, the exponent n=3/2 is stable from p_c = 1.46 GPa up to 4.5 GPa and even at 8 GPa, the Fermi liquid relationship $\rho = AT^n$ with n=2 was not still recovered.

3) For the element Fe, NFL behaviour as revealed by resistivity variation with n=5/3 extends above the entire spin-mediated superconducting region. [1] At p = 31 GPa, where T_c vanishes, the A coefficient has decreased by around 50%, indicating a threshold value of A for superconductivity.

4) The high pressure superconductivity of $CeCu_2Si_2$ can be understood via an attractive interaction driven by charge fluctuations around a first order transition, with a critical endpoint at sufficiently low temperature. [1] It is noteworthy that superconductivity can develop despite huge residual resistivities, of the order of the Ioffe-Regel limit.

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