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Quantum critical regime in the phase diagram of $K_x Sr_{1-x} Fe_2 As_2^1$ BERND LORENZ, MELISSA GOOCH, TCSUH and Dept. of Physics, University of Houston, BING LV, ARNOLD M. GULOY, TCSUH and Dept. of Chemistry, University of Houston, CHING-WU CHU², TCSUH and Dept. of Physics, University of Houston — The electrical and thermoelectric properties of $K_x Sr_{1-x} Fe_2 As_2$ are investigated. While the temperature dependence of the resistivity of SrFe₂As₂ (x=0) and KFe₂As₂ (x=1) is strongly nonlinear over a large temperature range it becomes surprisingly linear for x close to $x_c = 0.4$ above the superconducting transition. This apparent deviation from the Fermi liquid behavior is similar to the high-T_c cuprate superconductors and may indicate the existence of a quantum critical regime above the superconducting dome. We show that the temperature dependence of the thermoelectric power S follows a logarithmic scaling, S/T = const.*log(T) at the critical value x_c . The experimental results are consistent with a Ginzburg-Landau model for FeAs compounds predicting quantum critical scaling with a dynamical exponent z=2 and an effective dimension d+z=4.

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²also at: LBNL Berkeley and HKUST Hong Kong

Bernd Lorenz TCSUH and Dept. of Physics, University of Houston

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