Asymmetric Metal-Insulator Transition in Ferromagnetic Films

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I will present experimental data and a theoretical interpretation of conductivity σ of thin Gd films as a function of temperature (T ~ 5 - 50 K) and disorder (sheet resistance R_0 ~ 4 – 40 kΩ) across the metal-insulator transition. While a fractional power law in T allows us to obtain the dynamical critical exponent z ~ 2.5, the collapse of the conductivity data σ (T, R_0) on to two finite-temperature scaling curves allows us to extract critical exponents for the correlation lengths as well. The best fit values for the correlation length exponents turn out to be distinctly different on the two sides of the transition, ν' ~ 1.4 for the correlation length on the metallic side and ν ~ 0.8 for the localization length on the insulating side. [See R. Misra, A.F. Hebard, K.A. Muttalib and P. Wölfle, cond-mat arXiv:1003.4195.]