RON PELED, Tel Aviv University

A power-law upper bound on the correlations in the two-dimensional random-field Ising model

As an example of the Imry-Ma phenomenon, the addition of an iid quenched random field to the two-dimensional Ising model eliminates the model's famed discontinuity in its magnetization's response to a uniform external field. Thus, even with a weak random field, the 2D Ising model has a unique infinite-volume Gibbs state at all temperatures. This fact may be quantified by considering the decay rate of the effect of boundary conditions on the magnetization in finite systems. This rate is known to be exponentially fast for a strong random field. Our main new result is a power-law upper bound which is valid at all field strengths and at all temperatures, including zero. Our analysis proceeds through a streamlined and quantified version of the Aizenman-Wehr proof of the Imry-Ma rounding effect.

Joint work with Michael Aizenman.