YUCHENG LIU, University of British Columbia

The torus plateau for the high-dimensional Ising model

We consider the Ising model on a d-dimensional discrete torus of volume r^d, in dimensions $d > 4$ and for large r, in the vicinity of the infinite-volume critical point β_c. We prove that for $\beta = \beta_c - \mathrm{const}\, r^{-d/2}$ (with a suitable constant) the susceptibility is bounded above and below by multiples of $r^{d/2}$, and that the two-point function has a "plateau" in the sense that it decays like $|x|^{-(d-2)}$ when $|x|$ is small relative to the volume but for larger $|x|$ it levels off to a constant value of order $r^{-d/2}$. We also prove that at $\beta = \beta_c - \mathrm{const}\, r^{-d/2}$ the renormalised coupling constant is nonzero, which implies a non-Gaussian limit for the average spin. The random current representation of the Ising model plays a central role in our analysis.