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Addendum

Some Rigorous Results on the Sherrington-Kirkpatrick Spin Glass Model

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The main result of [1] is that in the S–K spin glass model, with the random couplings $\{J_{ij}\}$, for all $\beta J<1$ the total free energy is of the form $F_0+\Delta F(\{J\})$ with F_0 an explicitly given function of β [of order $O(N)$] and ΔF a $\{J_{ij}\}$- dependent term whose distribution converges, when $N\to\infty$, to that of a shifted Gaussian variable with a given covariance [of order $O(1)$]. As correctly stated there, this result is derived under the (weak) assumption that the distribution of J_{ij} is symmetric with respect to zero and has finite moments of all orders. The explicit term F_0 was presented in [1] as coinciding with $\lim\limits_{N\to\infty}(\beta)^{-1}\log \mathrm{Av}(Z)$. That identification of F_0 is, however, valid only under the somewhat stronger assumption that $\mathrm{Av}(\exp(\alpha J))<\infty$ for some $\alpha>0$ [if not, then $\mathrm{Av}(Z)=\infty$ for all N]. We thank A. Bovier for bringing this point to our attention.

References

1. Aizenman, M., Lebowitz, J.L., Ruelle, D.: Some rigorous results on the Sherrington-Kirkpatrick spin glass model. Commun. Math. Phys. **112**, 3–20 (1987)

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