

## *Addendum*

# **Some Rigorous Results on the Sherrington-Kirkpatrick Spin Glass Model**

M. Aizenman<sup>1</sup>, J.L. Lebowitz<sup>2</sup>, and D. Ruelle<sup>3</sup>

<sup>1</sup> Courant Institute, New York University, 251 Mercer Street, New York, NY 10012, USA

<sup>2</sup> Department of Mathematics, Rutgers University, New Brunswick, NJ 08903, USA

<sup>3</sup> I.H.E.S., F-91440 Bures-sur-Yvette, France

Commun. Math. Phys. **112**, 3-20 (1987)

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  $\beta$  [of order  $O(N)$ ] and  $\Delta F$  a  $\{J_{ij}\}$ -dependent term whose distribution converges, when  $N \rightarrow \infty$ , 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  $\lim_{N \rightarrow \infty} (\beta)^{-1} \log \text{Av}(Z)$ . That identification of  $F_0$  is, however, valid only under the somewhat stronger assumption that  $\text{Av}(\exp(\alpha J)) < \infty$  for some  $\alpha > 0$  [if not, then  $\text{Av}(Z) = \infty$  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)

Communicated by A. Jaffe

Received January 19, 1988