

Zeitschrift: Helvetica Physica Acta

Band: 57 (1984)

Heft: 6

Artikel: Comment to numerical study of a long range Ising spin-glass : exact results for small samples

Autor: Kaschner, R. / Kobe, S.

DOI: <https://doi.org/10.5169/seals-115524>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 21.02.2026

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

Comment to numerical study of a long range Ising spin-glass: exact results for small samples

By R. Kaschner and S. Kobe, Sektion Physik, Technische Universität Dresden, DDR-8027 Dresden, GDR

(3. VIII. 1984)

Ariosa et al. [1] have studied Ising $s_i = \pm 1$ spin chains with a Ruderman-Kittel-Kasuya-Yosida-like interaction

$$J_{ij} = J_0 \frac{\cos(\alpha |x_i - x_j|)}{|x_i - x_j| + 1} \tag{1}$$

with $J_0 = -10$, $\alpha = 7\pi$ and random spin positions ($x_i = x_{i-1} + 20 \cdot r$, r being a random number, $0 \leq r \leq 1$) as a model for a long range spin-glass. To have a well

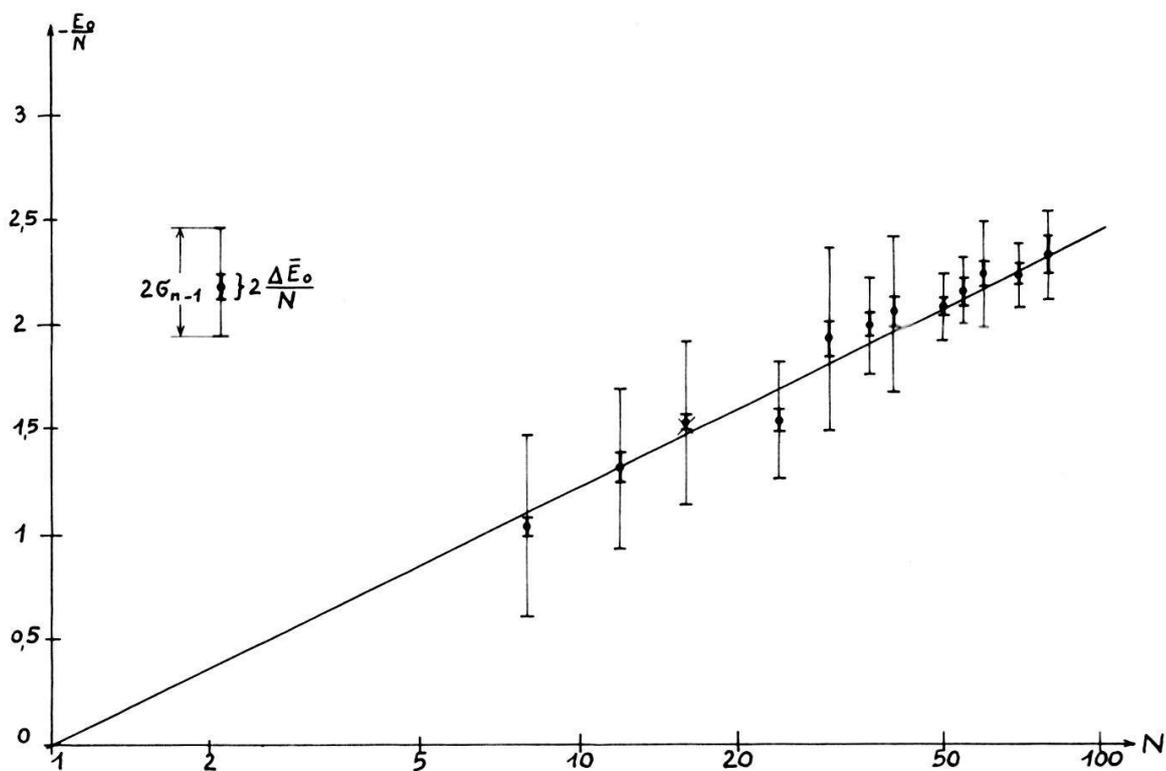


Figure 1

Averaged ground state energy per spin E_0/N as function of the number of spins N . The points represent the values \bar{E}_0/N averaged about n configurations with standard deviations σ_{n-1} and $\Delta \bar{E}_0/N = \sigma_{n-1}/\sqrt{n-1}$; \times from [1]. The straight line represents $E_0/N = -0.53 \ln N$.

defined thermodynamic limit the coupling constant J_0 has to be replaced by $J_0/\rho(N)$, $\rho(N)$ being such that the free energy becomes extensive. In [1] $\rho(N) = N^{0.35}$ is determined numerically by extrapolation of the ground state energy for small samples with $N=8, 12$ and 16 having in mind that this power law approximates the suggestion

$$\rho(N) = \ln N \tag{2}$$

very well for small N .

Using a new procedure to find the exact ground state of Ising systems without enumeration of all 2^{N-1} states [2] we were able to recalculate $\rho(N)$ up to $N=80$. The samples were chosen following the same criteria as in [1], section III [3].

The results (Fig. 1) show that the function (2) is more suitable than a power law for the given case. For the averaged ground state energy we found $\bar{E}_0(N) = -0.53N \ln N$. Thus the rescaling procedure in [1] for energies and temperature on the basis of (2) is confirmed with greater confidence.

The authors are grateful to Prof. P. Ziesche for the promotion of this comment and to Prof. M. Droz for a correspondence.

REFERENCES

- [1] D. ARIOSA, M. DROZ and A. MALASPINAS, *Helv. Phys. Acta* 55, 29 (1982).
- [2] A. HARTWIG, F. DASKE and S. KOBE, *Comp. Phys. Commun.* 32, 133 (1984).
- [3] M. DROZ, private communication.