Astérisque

J. SLAWNY

Phase transitions in ferromagnetic spin systems at low temperatures

Astérisque, tome 40 (1976), p. 181-182

<http://www.numdam.org/item?id=AST_1976__40__181_0>

© Société mathématique de France, 1976, tous droits réservés.

L'accès aux archives de la collection « Astérisque » (http://smf4.emath.fr/Publications/Asterisque/) implique l'accord avec les conditions générales d'utilisation (http://www.numdam.org/conditions). Toute utilisation commerciale ou impression systématique est constitutive d'une infraction pénale. Toute copie ou impression de ce fichier doit contenir la présente mention de copyright.

NUMDAM

Article numérisé dans le cadre du programme
Numérisation de documents anciens mathématiques
http://www.numdam.org/

Société Mathématique de France
Astérisque 40 (1976) p.181-182

PHASE TRANSITIONS IN FERROMAGNETIC SPIN SYSTEMS AT LOW TEMPERATURES

J. Slawny

In a joint work of W. Holsztyński and the author a criterium of the existence of phase transitions in ferromagnetic spin systems at low temperatures has been given. It involves properties of an algebra canonically associated with any such system:

Let $\mathbb{F}_2[\mathbb{Z}^\nu]$ be the group algebra of the group $\mathbb{Z}^\nu$ of translations with coefficients in the two-element field $\mathbb{F}_2 = \{0,1\}$; with a ferromagnetic interaction J one associates an ideal $\bar{B}(J)$ of $\mathbb{F}_2[\mathbb{Z}^\nu]$. It then appears that <u>if this ideal is not a principal one the system exhibits phase transitions at low enough temperatures</u>.

As far as the calculations are concerned, to apply this criterium one has to find the greatest common divisor of few polynomials (with coefficients in $\mathbb{F}_2$) and to find out if this g.c.d. belongs to $\bar{B}(J)$. This is a rather easy task.

The criterium can be developped into a method of calculation of all ergodic equilibrium states at low temperatures. One then easily produces examples of models with a large number of ergodic equilibrium states and with varying mixing properties.

The details and a number of examples can be found in:

[1] W. Holsztyński, J. Slawny, Phases of Ferromagnetic Spin Systems at Low Temperatures, Lett. N.C. 1975.

[2] W. Holsztyński, J. Slawny, In preparation.

[3] J. Slawny, Ferromagnetic Spin Systems at Low Temperature, to appear in Commun. Math. Phys.

CNRS, Physique Théorique
31 chemin J.Aiguier
13274 Marseille cedex 2