

Lecture Notes in Physics

Editors: J. Ehlers, K. Hepp, R. Kippenhahn, H.-A. Weidenmüller,
J. Zittartz
Managing Editor: W. Beiglböck

Volume 103

P.A. MARTIN

Modèles en Mécanique Statistique des Processus Irréversibles

Cours organisé par le Troisième Cycle de la Physique en Suisse Romande

This book presents a detailed analysis of some illustrative models in statistical mechanics of irreversible processes. The models are chosen as prototypes of phenomena which occur in complex physical situations, but they are formulated in a sufficiently simple way to be treated exactly:

- the Lorentz gas as a simple classical system for which the Boltzmann equation can be derived from the kinetics of collisions;
- the open Ising and BCS models. In the framework of the theory of open systems these exhibit nonlinear macroscopic dynamics with bifurcation at the critical temperature;
- the laser as an open system with a nonequilibrium phase transition.

In each case the presentation displays in a mathematically explicit way the passage from the underlying microscopic hamiltonian dynamics to the macroscopic irreversible evolution laws.

Table de matières: Introduction.— Le gaz de Lorentz et l'équation de Boltzmann.— Les équations maîtresses et les modèles de spins ouverts.— Le laser.

1979. 16 illustrations. IV, 134 pages.
DM 18,-; approx. US \$10.10
ISBN 3-540-09509-8

Volume 104

Dynamical Critical Phenomena and Related Topics

Proceedings of the International Conference, Held at the University of Geneva, Switzerland, April 2-6, 1979
Editor: C.P.ENZ

This volume contains the invited talks at the CDC-Meeting in Geneva devoted to dynamical phenomena in the critical domain of closed equilibrium systems and to instabilities of open non-equilibrium systems. Critical surveys of mode-coupling, renormalization group and field theoretic methods were given. Critical damping of second sound in liquid helium was presented together with the recent explanation of the discrepancies between theory and experiment. The very latest experimental and theoretical developments on the question of the central peak in the critical domain near structural phase transitions can be found in this volume. Furthermore, CDC dealt with low-dimensional systems and systems with random parameters. Various speakers were concerned with hydrodynamic instabilities and critical dynamics far from equilibrium, including experimental verification of Kawasaki's theory and a review on the laser.

Contents: Mode-Coupling and the Dynamical Renormalization Group.— Real Space Dynamical Renormalization Group Methods.— Critical Dynamics of Liquid Helium.— Panel on the Central Peak Problem.— Dynamics of Spin Glasses and Low-Dimensional Systems.— Hydrodynamic Instabilities and Turbulence.— Systems far away from Equilibrium.

1979. 105 figures, 3 tables. XII, 390 pages.
DM 39,-; approx. US \$21.90
ISBN 3-540-09523-3

Volume 105

Dynamics and Instability of Fluid Interfaces

Proceedings of a meeting, held at the Technical University of Denmark, Lyngby, May 1978
Editor: T. Smith Sørensen

With contributions by P.M. Bisch, W. Dalle-Vedove, N.F. Djabbarah, M. Hennenberg, I.B. Ivanov, R.K. Jain, H. Linde, C. Maldarelli, E. Ruckenstein, A. Sanfeld, P. Schwartz, S.T. Shah, T.S. Sørensen, A. Steinchen, D. Van Lamsweerde-Gallez, M.G. Velarde, M. Vignes-Adler, M.K. Vora, D.T. Wasan, H. Wilke

The volume contains nine lectures on the problems of surface chemistry and physics. Theoretical and experimental aspects of instability problems as well as dynamical effects are dealt with. A diversity of techniques is presented showing the interplay between surface and colloid science with concepts from hydrodynamics, irreversible thermodynamics, stability analysis, electrochemistry and cell biology. The book is a source of information for researchers in chemical engineering, physical chemistry and biophysics.

1979. V, 315 pages.
DM 32,-; approx. US \$18.00
ISBN 3-540-09524-1

Volume 106

Feynman Path Integrals

Proceedings of the International Colloquium
Held in Marseille, May 1978
Editors: S. Albeverio, P. Combe, R. Höegh-Krohn, G. Rideau,
M. Sirugue-Collin, M. Sirugue, R. Stora

This volume presents 32 papers on diverse aspects of the Feynman path integral. Various definitions are given, including one on a curved space time and also the noncommutation spin versions. Other papers are devoted to the relation to stochastic integrals, to oscillatory integrals and to Fourier integral operators. Furthermore, the volume is concerned with basic problems in mathematical physics such as quantization procedures, formulation of quantum dynamics, and the role of gauge theories; various approaches are discussed in relation to the Feynman path integral. Among others, an entire section is devoted to the discussion of formal expansions around the classical limit.

1979. 20 figures, 3 tables. XI, 451 pages. (36 pages in French)
DM 42,50; approx. US \$23.80
ISBN 3-540-09532-2

5691/5/1



Springer-Verlag Berlin Heidelberg New York

Communications in
**Mathematical
Physics**

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