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Computer Simulation Studies in Condensed Matter Physics II

New Directions

Proceedings of the Second Workshop,
Athens, GA, USA, February 20–24, 1989

Editors: D. P. Landau, K. K. Mon,
and H.-B. Schüttler

With 88 Figures

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Preface

Computer simulations are becoming increasingly important in condensed matter physics, making significant contributions in new approaches to and in new results for important physical problems. The workshop on "Recent Developments in Computer Simulation Studies in Condensed Matter Physics", held at the Center for Simulational Physics at the University of Georgia, February 20–24, 1989, brought together experienced practitioners in this field, as well as students and faculty members who are new to simulations, and provided a forum for the presentation and exchange of new ideas and recent developments. These proceedings are a record of the workshop and are published with the goal of timely dissemination of the papers to a wider audience.

Although by their very nature workshops are limited in their scope of coverage, a broad range of current topics is discussed. The papers present new techniques and results on both static and dynamical phenomena of classical and quantum mechanical systems. The reader will find descriptions of studies of static properties as well as time-dependent ones where time may be real time, stochastic time or imaginary (path integral) time.

A substantial portion of the material, the first part of the proceedings, deals with simulations of classical systems. Sophisticated implementation of vector algorithms is reviewed and new approaches using parallel systems are discussed. New methods for analyzing Monte Carlo data are presented as well as new applications of the Monte Carlo method itself, e.g., damage spreading. Both standard and novel Monte Carlo methods have been used to study static properties at phase transitions and new material is presented for the formation of aggregates. Molecular dynamics and/or Monte Carlo approaches have been developed for studying fluid flow as well as for polymer systems.

The second part of the proceedings is devoted to the simulation of quantum systems. New algorithms and results for interacting fermion systems are presented with emphasis on models which are relevant to superconductivity and magnetism. The workshop also included several presentations about emerging computer technologies and programming methods but for the most part no written record is available.

We hope that the readers will benefit from papers in their own particular field as well as gain new ideas from other related specialities.

This workshop was made possible through the generous support of the Center for Simulational Physics and the Vice President for Research at the University of Georgia.

Athens, GA, April 1989 *D.P. Landau · K.K. Mon · H.-B. Schüttler*

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