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Statistical and Dynamical Aspects of Mesoscopic Systems

Proceedings of the XVI Sitges Conference
on Statistical Mechanics
Held at Sitges, Barcelona, Spain, 7-11 June 1999



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Preface

One of the most significant developments in physics in recent years concerns mesoscopic systems, a subfield of condensed matter physics which has achieved proper identity. The main objective of mesoscopic physics is to understand the physical properties of systems that are not as small as single atoms, but small enough that properties can differ significantly from those of a large piece of material. This field is not only of fundamental interest in its own right, but it also offers the possibility of implementing new generations of high-performance nano-scale electronic and mechanical devices. In fact, interest in this field has been initiated at the request of modern electronics which demands the development of more and more reduced structures. Understanding the unusual properties these structures possess requires collaboration between disparate disciplines. The future development of this promising field depends on finding solutions to a series of fundamental problems where, due to the inherent complexity of the devices, statistical mechanics may play a very significant role. In fact, many of the techniques utilized in the analysis and characterization of these systems have been borrowed from that discipline.

Motivated by these features, we have compiled this new edition of the Sitges Conference. We have given a general overview of the field including topics such as quantum chaos, random systems and localization, quantum dots, noise and fluctuations, mesoscopic optics, quantum computation, quantum transport in nanostructures, time-dependent phenomena, and driven tunneling, among others.

The Conference was the first of a series of two Euroconferences focusing on the topic *Nonlinear Phenomena in Classical and Quantum Systems*. It was sponsored by CEE (Euroconference) and by institutions who generously provided financial support: DGICYT of the Spanish Government, CIRIT of the Generalitat of Catalunya, the European Physical Society, Universitat de Barcelona and Universidad Carlos III de Madrid. It was distinguished by the European Physical Society as a Europhysics Conference. The city of Sitges allowed us, as usual, to use the Palau Maricel as the lecture hall.

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Finally, we are also very grateful to all those who collaborated in the organization of the event, Profs. F. Guinea and F. Sols, Drs. A. Pérez-Madrid and O. Bulashenko, as well as M. González, T. Alarcón and I. Santamaría-Holek.

Barcelona, February 2000

The Editors

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