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Quantum Monte Carlo Methods in Equilibrium and Nonequilibrium Systems

Proceedings of the Ninth Taniguchi
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Foreword

Speech by Toyosaburo Taniguchi

Dr. Kubo, Chairman, Distinguished Guests, and Friends,

I am very happy, pleased and honored to be here this evening with so many distinguished guests, friends, and scholars from within this country and from different parts of the world. The Taniguchi Foundation wishes to extend a warm and sincere welcome to the many participants of the Ninth International Symposium on the Theory of Condensed Matter, which series was inaugurated eight years ago through the strenuous efforts of Dr. Ryogo Kubo, who is gracing us today with his presence.

We are deeply indebted to Dr. Kubo, Dr. Suzuki, and their associates, who have spent an enormous amount of time and effort to make this particular symposium possible. We are convinced that the foundation should not be considered as what makes our symposium a success. The success is entirely due, I feel, to the continuous efforts of the Organizing Committee and of all those who have lent their support to this program. In this sense, your words of praise about the symposium, if any, should be directed to all of them.

So far, I have met in person a total of 62 participants in this Division from 12 countries: Argentina, Belgium, Canada, Denmark, the Federal Republic of Germany, France, Ireland, Israel, Rumania, Switzerland, the United Kingdom, and the United States of America, with 133 participants from Japan. Those friends I have been privileged to make, I shall always treasure.

Whenever I meet with the participants in our symposia, both young and old, I am deeply impressed by the unselfish and sincere dedication they display in pursuing their vocation. To those younger people who are made welcome by world-famous scholars as their friends, we offer our hopes that even after climbing the ladder of academic fame within, say, the next 10, 20 or 30 years, you will join forces, and help to forge closer bonds of friendship and cooperation in a manner that will make a major contribution not only to academia but also to permanent world peace. And, it is our hope that our symposia be continued as long as the fund

permits, for several more years at least.

In conclusion, we sincerely trust that all the participants, both Japanese and foreign, will return home with pleasant memories of the symposium and of our enjoyable time together.

Thank you.

Preface

This volume contains papers presented at the Ninth Taniguchi Symposium on the Theory of Condensed Matter, which was held 14–18 November, 1986, at Susono, Japan. The topic of the symposium was “Quantum Monte Carlo Methods in Equilibrium and Nonequilibrium Systems”.

The field of quantum Monte Carlo methods in equilibrium and nonequilibrium systems, namely quantum statistical Monte Carlo methods, has been studied only for about ten years. Quite recently many physicists began to work in this field, partly because larger-scale and higher-speed computers are now available, and partly because many important problems cannot yet be solved analytically. The basic idea of quantum statistical Monte Carlo methods is to transform the relevant d -dimensional quantum system into the corresponding $(d+1)$ -dimensional classical system, using the generalized Trotter formula.

This volume consists of three parts. In the first paper of Part I, quantum statistical Monte Carlo methods are reviewed generally with great emphasis on methodology and some mathematical aspects such as the convergence and correction of the so-called ST transformation. The following four papers treat some general aspects of quantum systems, which are related to the quantum Monte Carlo approach. Part II contains ten papers which treat quantum spin systems using quantum statistical Monte Carlo methods, and two papers which treat quantum spin glasses. The five papers in Part III treat fermion systems, including nuclear systems.

The present Taniguchi Symposium was supported by the Taniguchi Foundation. Mr. Toyosaburo Taniguchi, who is the former president of Toyobo Co., Ltd., has supported various academic activities in the natural and human sciences for many years. His speech delivered at the reception in Kyoto after the symposium appears as the Foreword to this volume to illustrate the philosophy behind this support.

On behalf of all the participants we would like to express our hearty thanks to Mr. Taniguchi and the members of the Taniguchi Foundation.

Tokyo, 1
March 1987

Masuo Suzuki



First row (left to right)

N. Ito, M. Kolb, J.E. Hirsh, M. Suzuki, R. Kubo, D.J. Scalapino, J.W. Negele,
J. Gubernatis, T. Onogi, K. Saitoh

Second row (left to right)

H. De Raedt, M.A. Novotny, H. Betsuyaku, M. Imada, T. Oguchi, S. Homma,
I. Morgenstern

Third row (left to right)

S. Miyashita, H. Takano, H. Ishii, O. Nagai, M. Marcu

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