

PREFACE

The Eighth International Symposium on Foundations of Quantum Mechanics in the Light of New Technology (ISQM-TOKYO '05) was held on August 22–25, 2005 at the Advanced Research Laboratory, Hitachi, Ltd. in Hatoyama, Saitama, Japan. The symposium was organized by its own scientific committee under the auspices of the Physical Society of Japan, the Japan Society of Applied Physics, and the Advanced Research Laboratory, Hitachi, Ltd. Over 130 participants (23 from abroad) attended the symposium, and 30 invited oral papers, 7 contributed oral papers, and 37 poster papers were presented.

Just as in the previous seven symposia, the aim was to link the recent advances in technology with fundamental problems in quantum mechanics. It provided a unique interdisciplinary forum where scientists from different disciplines, who would otherwise never meet each other, convened to discuss basic problems of common interest in quantum science and technology from various aspects and “in the light of new technology.”

Quantum Coherence, Decoherence, and Geometrical Phase was chosen as the main theme for the present symposium because of its importance in quantum science and technology. This topic was reexamined from all aspects, not only in terms of quantum computing, quantum information, and mesoscopic physics, but also in terms of the physics of precise measurement, spin related phenomena, and other fundamental problems in quantum physics. We were delighted that many active and eminent researchers in these fields accepted our invitation.

We are now very happy to offer the fruits of the symposium in the form of the proceedings to a wider audience. As shown in the table of contents, the proceedings include a special lecture on Einstein by Professor C.N. Yang, which was really well-timed with the World Year of Physics 2005, and 63 refereed papers in ten sections: quantum information and entanglement, quantum computing; quantum-dot systems, anomalous Hall effect and spin-Hall effect, spin related phenomena, superconductivity in nano-systems, novel properties of carbon nanotubes, novel properties of nano-systems, precise measurements, and fundamental problems in quantum physics. We will mention just some of the important key words here to give the flavor of the proceedings: quantum computation and communication, qubits, quantum dots, spintronics, mesoscopic spins, Berry phase, nanowires, Josephson junctions, and vortices in high-temperature superconductors. We hope that the proceedings will not only be the record of the symposium but also serve as a good reference book for experts on quantum coherence and decoherence and as an introductory book for newcomers in this field.

In conclusion, we thank the participants for their contribution to the symposium's success. Thanks are also due to all the authors who prepared manuscripts and to the referees who kindly reviewed the papers. We also thank the members of the Advisory Committee and Organizing Committee; without their invaluable assistance, the symposium would not have been a success. Finally, we would like to express our deepest gratitude to the Advanced Research Laboratory, Hitachi, Ltd. and its General Manager, Dr. Nobuyuki Osakabe, for providing us with financial support and an environment that was ideal for lively discussion. We also thank his staff members, in particular Mr. Yoshimasa Yamamoto and Ms. Maki Shinkai, for their efforts in making the symposium enjoyable as well as productive.

March 2006

Sachio Ishioka
Kazuo Fujikawa