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**PROCEEDINGS OF INTERNATIONAL
SYMPOSIUM ON ADVANCED
TOPICS OF QUANTUM
PHYSICS**

Edited by

J. Q. Liang, M. L. Wang, S. N. Qiao, D. C. Su



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**INTERNATIONAL SYMPOSIUM ON
ADVANCED TOPICS OF QUANTUM PHYSICS**

**ON OCCASION OF 90TH ANNIVERSARY OF FOUNDING
OF SHANXI UNIVERSITY**

SUPPORTED BY

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PREFACE

The International Symposium on Advanced Topics of Quantum Physics (ISATQP-SHANXI' 92) was held in Taiyuan, Shanxi Province of China from June 12 to June 16, 1992. The symposium was organized by Shanxi University on occasion of the 90th anniversary of her founding under the auspices of the Commission of Science and Technology of Shanxi Province, the Education Commission of Shanxi Province, the Natural Sciences Foundation of China and the International Centre for Theoretical Physics. Shanxi People's Government in particular provided the symposium with very generous financial support 95 scientists from 12 countries attended the symposium and 68 papers were presented.

The Symposium was devoted to the topological aspects and problems of quantum physics, ranging from condensed matter physics to quantum field theory. So far these are all hot topics of the diverse areas of theoretical physics. Quantum topological phases, namely, the Aharonov-Bohm and Berry phases, are the subjects in which nontrivial topology of space-time appears to play a relevant role. The quantum phases share the common mathematical theme of holonomy. Multiplicative phases of geometrical origin have been to be important in a startling variety of physical phenomena.

For identical particle in two-space dimension, the admissible quantum mechanics is associated with intermediate statistics between Bose and Fermi, whence such particles are called anyon. The fact that two-dimensional electronic systems are relevant for physics was shown first in the study of fractional quantum hall effect. The elementary excitations above the ground state were proved to obey anyon statistics which seems to be also relevant to the explanation of the high-T_c superconductivity.

The anomalies in quantum field theory arise from the difficult classical symmetries at the quantum level. The techniques in dealing with anomalies and problems of quantization of anomalous gauge theories were discussed.

A good number of presentations were also devoted to other topics such as the new development and interpretation of quantum mechanics, quantum group and quantum chaos, geometrical description of quantum theory and dynamics of constrained systems, and problems in quantum optics.

The symposium was originally proposed by Professor A. Inomata and Prof. P. Y. Cai, former director of the Education Commission of Shanxi Province. Professor P. Y. Cai initiated the organization work in person. The organizers are grateful to him as well as to the members of the advisory committee for their encouragement and their valuable suggestions.

J. Q. Liang

Taiyuan, Shanxi, June 6, 1993