# Lecture Notes in Physics



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R. Alicki
K. Lendi

# Quantum Dynamical Semigroups and Applications

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**Authors**

Robert Alicki
Institute of Theoretical Physics and Astrophysics
University of Gdańsk, PL-80-952 Gdańsk, Poland

Karl Lendi
Institute of Physical Chemistry, University of Zürich
CH-8057 Zürich, Switzerland

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# PREFACE

The original idea of publishing Lecture Notes on this topic arose spontaneously after invited talks given by the authors at the XXth Symposium of Theoretical Chemistry held in 1984 in Emmetten, Switzerland. As a result of many discussions we felt a real need for popularization of the unifying and fruitful, but apparently widely unknown, concept of complete positivity. The associated semigroup dynamics of open quantum systems covers so many different types of interesting irreversible processes that this theory should be made more easily accessible to a wider public. Our common desire to give a rather broad presentation of the subject soon caused the manuscripts to lose their original character of contributions to conference proceedings. During continuous attempts to improve upon the actual versions and to include more and more topics and the latest research results, much time elapsed, and now we can say that many conference talks, many special lecture courses given at the universities of Gdańsk and Zürich and various recently published and also unpublished papers, as well as discussions with colleagues, contributed to the final versions.

Each author's contribution reflects strongly the area of his own research activities, but we could not resist the challenge of a joint presentation as a synthesis of a whole with a broad spectrum ranging from the abstract theory up to very concrete applications, even to recent experiments.

We hope that this book provides a valuable survey of many relevant aspects of the quantum theory of irreversible processes.

R. Alicki
Gdańsk, June 1987

K. Lendi
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