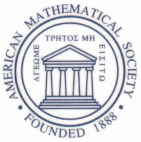
CONTEMPORARY MATHEMATICS

447

Adventures in Mathematical Physics

International Conference in Honor of Jean-Michel Combes
on Transport and Spectral Problems in Quantum Mechanics
September 4–6, 2006
Université de Cergy-Pontoise
Cergy-Pontoise, France

François Germinet
Peter D. Hislop
Editors



American Mathematical Society

http://dx.doi.org/10.1090/conm/447

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2000 *Mathematics Subject Classification.* Primary 35Pxx, 35Qxx, 35Sxx, 47Axx, 81-XX.

Library of Congress Cataloging-in-Publication Data

International Conference on Transport and Spectral Problems in Quantum Mechanics (2006 : Université de Cergy-Pontoise)

Adventures in mathematical physics : International Conference on Transport and Spectral Problems in Quantum Mechanics in honor of Jean-Michel Combes, September 4–6, 2006, Université de Cergy-Pontoise, Cergy-Pontoise, France / François Germinet, Peter D. Hislop, editors.

p. cm. — (Contemporary mathematics, ISSN 0271-4132 : v. 447)

Includes bibliographical references.

ISBN 978-0-8218-4241-6 (alk. paper)

1. Quantum theory—Congresses. 2. Statistical mechanics—Congresses. 3. Mathematical physics—Congresses. I. Combes, J. M. (Jean-Michel), 1941– II. Germinet, François, 1970– III. Hislop, Peter D., 1955– IV. Title.

QC173.96I565 2007
530.12—dc22 2007060847

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10 9 8 7 6 5 4 3 2 1 12 11 10 09 08 07

Dedication

The international conference, *Transport and Spectral Problems in Quantum Mechanics*, was held September 4–6, 2006, at Université de Cergy-Pontoise, Cergy-Pontoise, France, in honor of Jean-Michel Combes on the occasion of his sixtieth-fifth birthday. Sixty young and young-at-heart researchers from around the world gathered for three days to honor Jean-Michel. Twenty-six speakers had the opportunity to dedicate their talk to their friend and colleague. This volume, dedicated to Jean-Michel, contains original, refereed research papers on a wide variety of fields in mathematical quantum and statistical mechanics written by conference speakers.

For more than three decades, Jean-Michel Combes has made seminal contributions to mathematical quantum mechanics. His research has covered topics such as N-body quantum mechanical scattering theory, the Born-Oppenheimer approximation for molecules, the semiclassical approximation, quantum tunneling, the quantum theory of resonances, the behavior of eigenfunctions of Schrödinger operators, transport properties of quantum Hamiltonians, photonic crystals, and the theory of random Schrödinger operators. His name will be forever associated with, among other topics, dilation analyticity and the Combes-Thomas method for proving exponential decay of eigenfunctions. His research is guided by a penetrating insight into important physical questions and a fine mathematical skill that enables him to find elegant solutions. He has been a source of inspiration and support for mathematical physicists around the world, and he has been especially supportive of young people in the field, either as their doctoral or post-doctoral advisor, or as a mentor. Jean-Michel and his wife Nicole have always graciously and warmly welcomed colleagues from around the world in their home. All of the participants wish Jean-Michel continued success in his research, and Jean-Michel and Nicole many happy years.

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Preface

Transport and Spectral Problems in Quantum Mechanics: A Conference in honor of Jean-Michel Combes was held September 4–6, 2006, at Université de Cergy-Pontoise, Cergy-Pontoise, France. The scientific committee consisted of Jean-Marie Barbaroux (Toulon), François Dunlop (Cergy-Pontoise), François Germinet (Cergy-Pontoise), Peter D. Hislop (Kentucky), and Frédéric Klopp (Paris 13). The organizing committee consisted of François Dunlop, François Germinet, and Mathieu Lewin, all of the Université de Cergy-Pontoise.

This volume contains eighteen research papers based on talks presented by the participants. The topics of the papers are areas of active research in quantum and statistical mechanics including open quantum systems, random Schrödinger operators, quantum graphs, variational and perturbative methods in quantum theory, quantum information theory, estimates on eigenfunctions and solutions to partial differential equations, quantum transport, semiclassical methods, and random matrix theory.

The conference was financially supported by le Centre National de la Recherche Scientifique (France), l'Université de Cergy-Pontoise, le Laboratoire de Physique Théorique et Modélization et le Laboratoire de Mathématiques: Analyse, Géométrie, Modélization, de l'Université de Cergy-Pontoise, le Laboratoire Analyse, Géométrie et Applications de l'Université Paris 13. We thank the Université de Cergy-Pontoise for hosting this conference, and special thanks to Amina Adbelmoumene for all her help.

François Germinet
Peter D. Hislop
August 2007

This volume consists of refereed research articles written by some of the speakers at this international conference in honor of the sixty-fifth birthday of Jean-Michel Combes. The topics span modern mathematical physics with contributions on state-of-the-art results in the theory of random operators, including localization for random Schrödinger operators with general probability measures, random magnetic Schrödinger operators, and interacting multiparticle operators with random potentials; transport properties of Schrödinger operators and classical Hamiltonian systems; equilibrium and nonequilibrium properties of open quantum systems; semiclassical methods for multiparticle systems and long-time evolution of wave packets; modeling of nanostructures; properties of eigenfunctions for first-order systems and solutions to the Ginzburg-Landau system; effective Hamiltonians for quantum resonances; quantum graphs, including scattering theory and trace formulas; random matrix theory; and quantum information theory. Graduate students and researchers will benefit from the accessibility of these articles and their current bibliographies.

ISBN 978-0-8218-4241-6

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CONM/447

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