

Springer Proceedings in Mathematics & Statistics

Volume 162

Springer Proceedings in Mathematics & Statistics

This book series features volumes composed of selected contributions from workshops and conferences in all areas of current research in mathematics and statistics, including operation research and optimization. In addition to an overall evaluation of the interest, scientific quality, and timeliness of each proposal at the hands of the publisher, individual contributions are all refereed to the high quality standards of leading journals in the field. Thus, this series provides the research community with well-edited, authoritative reports on developments in the most exciting areas of mathematical and statistical research today.

More information about this series at <http://www.springer.com/series/10533>

Patrícia Gonçalves · Ana Jacinta Soares
Editors

From Particle Systems to Partial Differential Equations III

Particle Systems and PDEs III, Braga,
Portugal, December 2014

Editors

Patrícia Gonçalves
Centre of Mathematics
University of Minho
Braga
Portugal

Ana Jacinta Soares
Centre of Mathematics
University of Minho
Braga
Portugal

ISSN 2194-1009

ISSN 2194-1017 (electronic)

Springer Proceedings in Mathematics & Statistics

ISBN 978-3-319-32142-4

ISBN 978-3-319-32144-8 (eBook)

DOI 10.1007/978-3-319-32144-8

Library of Congress Control Number: 2014938099

Mathematics Subject Classification (2010): 35L67, 35R60, 35Q20, 35Q30, 35Q35, 60K35, 60G60, 60F17, 82C40

© Springer International Publishing Switzerland 2016

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature

The registered company is Springer International Publishing AG Switzerland

Preface

This volume presents the proceedings of the third international conference on particle systems and partial differential equations, “PS-PDEs III”, which was held at the Centre of Mathematics of the University of Minho in Braga, Portugal, during 17–19 December 2014.

The meeting was intended to bring together prominent active researchers working in the fields of probability and partial differential equations, so that they could present their latest scientific findings in both areas, and to promote discussion on some of their areas of expertise. Further, it was intended to introduce a vast and varied public, including young researchers, to the subject of interacting particle systems, its underlying motivation and its relation to partial differential equations.

This volume includes 16 contributed papers written by conference participants on essential and intriguing topics in the fields of probability theory, partial differential equations and kinetic theory.

We believe that this volume will be of great interest to probabilists, analysts and also to those mathematicians with a general interest in mathematical physics, stochastic processes and differential equations, as well as those physicists whose work intersects with statistical mechanics, statistical physics and kinetic theory.

We would like to take this opportunity to extend our thanks to all the speakers, and to the participants, for contributing to the success of this meeting.

Lastly, we wish to gratefully acknowledge the financial support provided by Fundação para a Ciência e a Tecnologia through the FCT-FACC funds, to the Centre of Mathematics of the University of Minho, to the Centre of Mathematics, Fundamental Applications and Operations Research of the University of Lisbon and to the Co-Lab initiative UT Austin-Portugal.

We really hope that you enjoy reading this book!

Braga, Portugal
February 2016

Patrícia Gonçalves
Ana Jacinta Soares

Contents

On Linear Hypocoercive BGK Models	1
Franz Achleitner, Anton Arnold and Eric A. Carlen	
Hydrodynamic Limit of Quantum Random Walks	39
Alexandre Baraviera, Tertuliano Franco and Adriana Neumann	
Sub-shock Formation in Reacting Gas Mixtures	51
Marzia Bisi, Fiammetta Conforto and Giorgio Martalò	
Compactness of Linearized Kinetic Operators	73
Laurent Boudin and Francesco Salvarani	
Asymptotics for FBSDES with Jumps and Connections with Partial Integral Differential Equations	99
André de Oliveira Gomes	
Entropy Dissipation Estimates for the Landau Equation: General Cross Sections	121
Laurent Desvillettes	
The Boltzmann Equation over \mathbb{R}^D: Dispersion Versus Dissipation	145
François Golse	
The Gradient Flow Approach to Hydrodynamic Limits for the Simple Exclusion Process	167
Max Fathi and Marielle Simon	
Symmetries and Martingales in a Stochastic Model for the Navier-Stokes Equation	185
Rémi Lassalle and Ana Bela Cruzeiro	
Convergence of Diffusion-Drift Many Particle Systems in Probability Under a Sobolev Norm	195
Jian-Guo Liu and Yuan Zhang	

From Market Data to Agent-Based Models and Stochastic Differential Equations 225
R. Vilela Mendes

Global Asymptotic Stability of a General Nonautonomous Cohen-Grossberg Model with Unbounded Amplification Functions 243
José J. Oliveira

Phase Transitions and Coarse-Graining for a System of Particles in the Continuum 263
Elena Pulvirenti and Dimitrios Tsagkarogiannis

Modelling of Systems with a Dispersed Phase: “Measuring” Small Sets in the Presence of Elliptic Operators. 285
Valeria Ricci

Derivation of the Boltzmann Equation: Hard Spheres, Short-Range Potentials and Beyond. 301
Chiara Saffirio

Duality Relations for the Periodic ASEP Conditioned on a Low Current 323
G.M. Schütz