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Cédric Bernardin • Patricia Gonçalves  
Editors

# From Particle Systems to Partial Differential Equations

Particle Systems and PDEs, Braga, Portugal,  
December 2012

*Editors*

Cédric Bernardin  
UMR CNRS-UNS 7351  
Laboratoire J.A.Dieudonné  
Université de Nice Sophia Antipolis  
Nice, France

Patricia Gonçalves  
Centre of Mathematics  
Universidade do Minho  
Braga, Portugal

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# Preface

This volume presents the proceedings of the international conference “Particle Systems and Partial Differential Equations I,” which took place at the Centre of Mathematics of the University of Minho, Braga, Portugal, from December 5–7, 2012.

The purpose of the conference was to bring together researchers from different areas of mathematics, namely, probability, partial differential equations, and kinetics theory. All of the participants had the opportunity to present their recently obtained results. The goal of the meeting was twofold:

1. To present to a varied public the subject of interacting particle systems, its motivation from the viewpoint of physics, and its relation with partial differential equations or kinetics theory
2. To stimulate discussions and possibly new collaborations among researchers with different backgrounds

The book contains some lecture notes written by François Golse on the derivation of hydrodynamic equations (compressible and incompressible Euler and Navier-Stokes) from the Boltzmann equation and several short papers written by some of the participants in the conference. Among the topics covered in these papers are hydrodynamic limits, fluctuations, phase transitions, motions of shocks and antishocks in exclusion processes, large number asymptotics for systems with self-consistent coupling, quasivariational inequalities, unique continuation properties for PDEs.

This volume will be valuable to probabilists, analysts, and also to mathematicians in general who are interested in statistical physics, stochastic processes, partial differential equations, and kinetics theory. We hope it would also prove useful to physicists.

The editors would like to take this opportunity to express their thanks to all the authors of this volume for their contributions. We would also like to thank FCT for support through the project PTDC/MAT/109844/2009, to CMAT for support by “FEDER” through the “Programa Operacional Factores de Competitividade COMPETE” and by FCT through the project PEst-C/MAT/UI0013/2011. We

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We really hope you enjoy reading the book!

Nice, France  
Braga, Portugal

Cédric Bernardin  
Patricia Gonçalves

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