

## Introduction

This special issue contains a selection of the lectures of the 9th edition of the *Summer School on Methods and Models of Kinetic Theory* (M&MKT 2018), held in Porto Ercole (Tuscany, Italy), on June 10–16, 2018, with the participation of more than sixty young and senior researchers, coming from ten different European Countries. The School is mainly aimed at presenting the updated state-of-the-art for important topics of significant interest in the field of kinetic theory and of its applications, considering both theoretical and numerical methods, relevant to the true Boltzmann equation as well as to other kinetic models. It is addressed especially to Ph.D. students, Post-Docs, and young researchers with some past experience, or else with a new interest, in these areas of Mathematical Physics.

The 9-th edition of the School was focused on three main courses of 5 hours each,

1. Well posedness for ODEs and transport equations, and applications,
2. On the derivation of the Boltzmann equation and of some fluid equations from deterministic particle systems,
3. Mean field approaches to interacting particles: asymptotics, numerical methods and applications,

which were delivered by three distinguished experts in the field, Luigi Ambrosio (SNS Pisa), Isabelle Gallagher (Paris Diderot), and Axel Klar (TU Kaiserslautern).

Beside the three courses, short courses and seminars were given by M. J. Cáceres (Granada), A. Frouvelle (Ceremade Paris), F. Golse (Polytechnique), T. Magin (Von Karman Institute), G. Puppo (Insubria e Sapienza).

Further information on the school can be obtained from the web site:

<http://mat521.unime.it/MMKT/>

In the frame of the aims and scopes of this Journal, the present issue publishes three extensive survey papers written by three of the above lecturers, summarizing the contents of their courses at the 2018 edition. In addition, this volume contains also a survey paper on one of the topics of the school, written by a member of the Scientific Committee.

The Scientific and Organizing Committee of the School

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