Introduction

This special issue is devoted to the 8th edition of the Summer School on Methods and Models of Kinetic Theory (M&MKT 2016), held in Porto Ercole (Tuscany, Italy), on June 5-11, 2016, with the participation of more than fifty young and senior researchers, coming from several countries, mainly from Europe, but also from Japan, Brazil, and from the U.S.A. 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 8-th edition of the School was focused on three main courses of 6 hours each,

1. Multiscale systems from particles to continuum: modelling and computation,

2. Kinetic equations for bacterial movements from molecular pathways to macroscopic equations,

3. Derivation of effective evolution equations from many body quantum mechanics,

which were delivered by three distinguished experts in the field, Giovanni Naldi (Milan), Benoit Perthame (Paris VI), and Benjamin Schlein (Zurich).

Beside the three courses, short courses and seminars were given by R. Adami, J. A. Canizo, B. Lods, S. Yasuda, C. Bardos, F. Golse, P. Tilli, E. Serra.

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 2016 edition.

The Scientific Committee of the School

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R. Monaco, C. Negulescu, G. Spiga