

PREFACE

Collective phenomena are at the core of the observed behavior of completely different macroscopic systems (with huge differences in time and length scales), which are usually investigated in separate research fields. In this volume this common link is clarified and emphasized, starting from a number of selected topics that exhibit an interdisciplinary character. The basic mechanisms underlying the formation of structures, patterns, self-organization, and turbulence in plasmas, fluids, and astrophysical systems are addressed, including: instabilities, such as Kelvin-Helmholtz, Rayleigh-Taylor, Rayleigh-Benard, magnetic reconnection, magneto-rotational and other plasma instabilities; Landau damping; and a number of related phenomena.

The International Workshop “Collective phenomena in macroscopic systems” at the basis of these Proceedings was held at Villa Olmo, on Lake Como, about 50 km North of Milano, from Monday December 4th to Wednesday December 6th 2006. This Workshop falls within a long tradition of Workshops and Schools held regularly either in Varenna or in Como.

The Workshop was co-organized by the Department of Physics of the Università degli Studi di Milano, by the International Centre for Theoretical Physics, Trieste, and by the Centro di Cultura Scientifica “Alessandro Volta” Villa Olmo, Como.

The content of the book is broadly divided in three parts, Plasma Physics, Fluid Dynamics, and Astrophysics. The sequence of papers in the volume closely follows the structure of the six oral sessions and the poster session of the Workshop. About fifty scientists attended and most of them participated actively by presenting a paper.

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