

PREFACE

The ADVANCED SUMMER SCHOOL 2006 (EAV06) was held at Cinvestav, Mexico City, on July 10-14, 2006. As in the previous year, the aim of the School was bring together graduate and advanced undergraduate students and researchers from the different areas developed at the Physics Department of Cinvestav. At the School a general overview of the current state of the art was presented on topics related with mathematical physics and gravitation, high energy physics, statistical, medical and solid state physics. The School was attended by 33 researches from Germany, Spain, U.S.A. and Mexico, and by about 120 students from Guatemala, Peru, and nineteen different institutions in Mexico. The courses in the School consisted of lectures starting from a general introduction and followed by a series of sessions at increasing level to reach applications and special topics.

During the School, seven courses were presented. The first one was introduced by Stephen Parke who lectured on Neutrinos in the Standard Model and beyond. A didactic overview on Rigged Hilbert spaces was covered by Rafael de la Madrid. David Aspnes taught different aspects of the Electrodynamic Properties of Nanoscopically Inhomogeneous Materials. Joe Greene lectured on the Nucleation, Growth, and the Evolution of Self-Organized Nanostructures. Special emphasis was given to understanding the interplay of surface and bulk diffusion processes on morphological evolution of compound surfaces. Albert Díaz-Guilera presented results of the last 8 years concerning complex networks which are far from being regular or completely random. Also in this field, Moisés Santillán discussed on gene regulatory dynamics and the mathematical techniques as well as procedures required to tackle complex genetic networks. Finally, Frank Scheffold presented some multiple light scattering techniques used to study turbid colloidal systems.

As a complement to the courses, nine invited talks were given by colleagues from Cinvestav. There were also twenty short talks given mainly by students. We thank to all of them for the professional attitude in preparing their speeches; their enthusiasm was contagious and produced a comfortable hard-working environment in the School.

The present volume of the AIP Conference Proceedings includes the lecture notes of all the courses, as well as the positively refereed contributions of the participants in the EAV06. As in the previous School, EAV05, most of the contributors submitted original results to be considered for publication. The contributions published in this volume were accepted in agreement with the decision of the anonymous referees. The proceedings are organized in five chapters according with our Physics Department's groups of research. In all cases, the chapter starts with the lecture notes of the courses while contributions are arranged according to similarity in subject.

The School was part of the activities celebrating the forty fifth anniversary of Cinvestav and the Physics Department. As it has been a tradition since the first Advanced

School in 1969, the high academic quality of the lectures was the primordial goal to celebrate the EAV06. Such a condition would be not possible without the financial and academic support of our Institution. The support of the Mexican Council for Science and Technology (CONACyT) is also acknowledged. Professors David Aspnes, Joe Greene and Stephen Parke were also partially supported by The United States-Mexico Foundation for Science and the Academia Mexicana de Ciencias. We are indebted to Professor José Mustre, Cinvestav's Provost, for his help in obtaining the SEP grants for the students who were supported by the EAV06. The encourage and assistance of Professor Gerardo Herrera, Chair of the Physics Department, was invaluable in solving some organizational and financial difficulties.

We are also indebted to all the people who dedicated many hours of their time to support the organization of the School. Our support team included Juan Barranco, Luz del Carmen Cortés, Sara Cruz, Nicolás Fernández, Elvia Lomelí and Israel Lomelí. Daniel Pérez gave important support to speakers, by solving all the problems that usually appears in any presentation. Beatriz Garrido helped us with some administrative and broadcasting tasks. We would like to especially thank Miriam Lomelí, secretary of the School, her experience in all the administrative duties was indispensable for a successful organization of the School, right from the early stages to the very end of the event. We acknowledge her effort and patience along the organization

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