

PREFACE

This book contains the lectures given at the International Summer School on Collective Motion and Phase Transitions in Nuclear Systems held in Predeal, Romania, in the period of August 28- September 9, 2006. The Nuclear Physics Schools organized by Institute of Physics and Nuclear Engineering are well known to physicists throughout the world due to their long history and good reputation. The first edition took place in Bucharest in 1964 and after five-year break the series continued regularly every second year in Predeal. For some administrative reasons, in 1978, the location of the school was changed from Predeal to Poiana Brasov. In 1991, however, we moved it back to Predeal and that happened since we wanted to restore the good tradition and also to recover the excellent conditions we had before.

This edition is organized by the University of Bucharest in collaboration with the Institute of Physics and Nuclear Engineering. The efforts were shared by the two important institutions mainly because some of the people from the Organizing Committee moved to University, aiming at having closer contacts with students.

The school from this year was devoted to the study of nuclear structure and dynamics of nuclear systems and their constituents. As shown in the table of contents, the chosen subjects cover a large area of modern nuclear physics. Various phases of nuclear matter at low and intermediate energies were studied. Nuclear structure subjects were always a central issue of nuclear physics. In our school some hot subjects like critical points in nuclear shape phase transitions, octupole deformed nuclei, approaches going beyond the meanfield approximation, nuclear molecules, exotic nuclei and neutron stars, synthesis of superheavy elements, relativistic covariant descriptions, received the deserved attention. Various features of multifragmentation processes were interpreted both in statistical and dynamical models. Also the particle production processes in heavy ion collisions are investigated. Two extensive lectures on dark matter and various scenarios for its detection were delivered. A possible link to certain mechanisms for neutrinoless double beta decay has been discussed. A QCD self-consistent description for dilepton production has been presented. Recent results for the proton structure investigated by (e, e') experiments at HERA was presented. The team

of speakers was constituted from distinguished professors from different important corners of the world. They presented, with high competence, the most recent results in their fields and sketched appealing perspectives.

I am happy to mention that the scientific climate was very good and that the lectures stimulated an active participation of the audience.

I hope that the near future will positively evaluate the benefit provided by the present school to participants. Having in mind the hot discussions of participants during the lectures, the large volume of exchanged scientific information, the established new collaborations, the common research plans sketched for the near future, we may assert that the main scope of the present school has been accomplished. The young physicists listened outstanding professors speaking about their results as well as about the open problems in their fields and due to these facts they returned to their home institutes with an increased optimism.

In order to allow the young physicists, who were not able to attend the school, to have access to the scientific information transferred there, I tried my best to make the proceedings ready for publication, in a reasonable short time. As a matter of fact this is the only reason we missed the lecture of Dr. N.V. Zamfir on critical points of phase transitions.

Besides invited lectures, many short communications were given. These will be collected in a special issue of Romanian Journal of Physics were some extended review papers are also invited.

I hope that the present volume will be very useful to a large category of nuclear physicists. Also, I am convinced that the scientific level of the lectures, the academic atmosphere and the beauty of the mountains surrounding the place are three decisive attractors for participants to the next edition.

A. A. Raduta