BOOK REVIEWS


High-energy particle physics and the cosmology of the early Universe belong to the main fields of fundamental physics. At present, they are merging into a single field of research. Both have their standard models (Chapters 1–6 and 15) which explain most of the observed phenomena, but which are still far from complete. Therefore a brief description of the elementary particle model is followed by Grand Unified Theories (Ch. 7), Technicolor (Ch. 8), Composite Model (Ch. 9), Supersymmetry (Ch. 10), General Relativity (Ch. 11), Supergravity (Ch. 12), Higher-dimensional Theories (Ch. 13) and String Theories (Ch. 14), i.e. by topics beyond the standard model.

The standard Big Bang model (Ch. 15) stresses those aspects which are of most interest to the high-energy physicists. Inflation theory (Ch. 16) and Gauge theories (Ch. 17) with nontrivial topological configurations (such as strings or monopoles) go beyond the standard model. Chapter 18 returns to the present Universe and describes astronomical sources of high-energy particles.

The reader is supposed to be acquainted with basic ideas of elementary particle physics, quantum field theory, the general theory of relativity and astrophysics, at the level of postgraduate students. For him the book will be a useful introduction into the fundamental structure of the Universe.

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Within one year this is the second Conference Report – (after the Capri Conference Report ‘Solar and Stellar Granulation’, Kluwer 1989) – on the structure and dynamics of the solar photosphere. The IAU Symposium 138 – held in Kiev with more than 200 participants from 24 countries – covered the whole field of physics of the solar atmosphere. The volume at hand contains 20 Invited Reviews and 37 Contributed Papers. Altogether these papers permit an excellent overview of the present state of the art in the following fields: global properties, fine structure, small-scale magnetic fields, MHD, large-scale structure and dynamics, generation of solar magnetic fields. One chapter deals with convection and magnetic fields in solar-type stars. A final chapter is dedicated to ‘Future Directions’.

Particularly valuable is the fact that many of the Invited Reviews not only give summaries of the present knowledge in their respective fields but also present brand-new scientific results. Extensive bibliographies raise further the value of the reviews. Results of observations and of computations are well balanced. From many contributions it is clearly visible how in recent years access to smaller and smaller solar structures has been reached.

The 117 posters presented during the symposium are regrettably mentioned only by their titles. I would like to join the remark in the Summary Lecture: ‘... nevertheless, it might be better to have one-page abstracts for these’.

In summary I regard this book as an essential source of knowledge about solved and unsolved problems of the solar photosphere. It should be available to every student of this field and to every physicist working actively in solar research.

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