Nobel Laureates and Twentieth-Century Physics

In this richly illustrated book the author combines history with real science. Using an original approach he presents the major achievements of twentieth-century physics – for example, relativity, quantum mechanics, atomic and nuclear physics, the invention of the transistor and the laser, superconductivity, binary pulsars, and the Bose–Einstein condensate – each as they emerged as the product of the genius of those physicists whose labours, since 1901, have been crowned with a Nobel Prize.

Here, in the form of a year-by-year chronicle, biographies and revealing personal anecdotes help bring to life the main events of the past hundred years. The work of the most famous physicists of the twentieth century – great names, such as Bohr, the Curies, Einstein, Fermi, Feynman, Gell-Mann, Heisenberg, Rutherford and Schrödinger – is presented, often in the words and imagery of the prizewinners themselves.

The author uses plain language to avoid technical jargon as much as possible. He does not hesitate, however, to explain abstruse theories when necessary. With clear step-by-step explanations and lively down-to-earth examples, this engaging work will be of interest to working scientists, students, and the lay reader curious about the wonders of the universe of science.

MAURO DARDO is professor of experimental physics at the newly founded *Amedeo Avogadro* University of Eastern Piedmont at Alessandria, in Northern Italy. Here from 1992 to 1998 he also served as dean of the faculty of sciences. He studied physics at the University of Turin, and obtained his doctor's degree there in 1964. Soon afterwards he began his teaching and research career. This took him first to the USA for a one-year study period, and then, in 1980, to Cagliari in Sardinia as professor of physics. Three years later, in 1983, occasion took him back to his *alma mater*, in Turin, to a post in the department of physics. He has taken part in research programmes in a number of different fields of physics, including cosmic rays, elementary particle physics and high-energy astrophysics. His special interests have long lain in the area of history in general – and the history of science, and the wider diffusion of scientific culture, in particular. He lives in a small town, rich in local traditions, in rural Piedmont, close to the border of the ancient marquisate of *Monferrato*, and within sight of the Alps.

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to my parents

Contents

Preface

This book is about the Nobel Prizes for physics: how they were awarded each year, and for what particular merit; how the discoveries that they have honoured fit into the wider picture of the evolution of twentieth-century physics, enlarged our understanding of nature and, in terms of new technologies, changed and moulded our everyday lives. But above all it is about the prizewinners themselves, how they came to make the contributions to science for which they are renowned and, through personal details and anecdotes, it aims to tell us what sort of people they were, and indeed are.

The book is divided into three parts. The first part contains an introductory chapter which includes a short description of the Nobel Prize. Then follow two chapters which deal with classical physics, in so far as it constitutes the roots of modern physics. These chapters, through a rapid historical journey, will present the reader with some fundamental concepts in physics, together with information about the giants of classical science, so taking the reader up to the doorstep of twentieth-century physics.

The second and third parts form the core of the book. They contain ten chapters, which, year by year, describe the work for which the awards were given, with short biographical notes on each Nobel laureate. In parallel, in each year, are included concise descriptions of the principal achievements in physics during the year itself. Each chapter begins with an introduction, which summarises the major events during the period in question, and each ends with illustrations and descriptions of sites where the most famous events took place. Finally, the reader will find a glossary of terms which we believe will be of assistance, especially if he or she is a non-specialist. Simple sketches and diagrams will help in understanding certain important concepts.

The author has tried wherever possible to use plain language and to avoid technical jargon, whilst nevertheless maintaining scientific and historical rigour.

Nobel Laureates and Twentieth-Century Physics is addressed to scientists active in the worlds of research or teaching, to students, both undergraduates and graduates: and also, and by no means least, to the general reader who is eager to venture into the great scientific themes that have distinguished the last hundred years of the history of physics and science in general.

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