

Introduction

The standard model of quantum physics has been built up over the last eighty years, thanks to discoveries in high-energy physics and enriched by various physicists' daring ideas. They have made numerous hypotheses, tested them, and retained those which best fit experimental results.

My friends, especially those less familiar with novel developments in physics, have asked me to write for a wider audience. This is a difficult exercise since, as Galileo pointed out, the language of physics is mathematics. Writing about serious physics with a minimum of mathematics thus turns out to be a considerable challenge: the well-informed reader may find my explanations too simplistic, while the non-specialist may still find it too difficult.

In writing this book I have chosen the form of a dialogue, as it seemed most suited for expounding on the ideas I intend to convey. This is partly also a tribute to Galileo's *Dialogo*, by which this present work has been much inspired. Moreover, it is a new physics that we have set out to explain. Hence after the first chapter where I briefly summarize the history of physics pertinent to my account, in the second chapter I proceed to discuss certain features of my own work. Of course, my point of view is naturally partial and one-sided, and so I say "I" out of necessity. And as in Galileo's time, novelties generate difficulties – controversy is unavoidable. This will be tackled in the third chapter.

Galileo's *Dialogue* is therefore a distant model; I do not intend to create a mere pastiche. Nonetheless I have the same subject matter: the physical laws that govern our universe. And like Galileo, I strive to sift through the old physics, sorting out what should be kept from what should no longer be.

Readers of this English edition will notice firstly, that in this account much of the older 20th century physics is to be kept, save for a few important exceptions. Moreover, I show that the so-called second quantization is at last rather easy to account for. And as for the numerous technical applications of quantum mechanics, I argue that these occur precisely in those areas of physics where, for the most part, the prevailing theory happens to be an excellent approximation of reality. Finally, since the publication of the first French edition, I have continued to make progress, hence the addition of a fourth chapter which explains these advances.

This English edition was adapted from the second French edition with the very useful help of Raymond Albert Ng, whom I sincerely thank.