Preface

This book grew out of conversations I had with a good friend of mine (Pier Paolo Casalboni, also known as "*Slim*"). During the summer vacations, while tanning on the beach in Cesenatico, he often asks me to tell him the latest news and the most peculiar ideas concerning my work as theoretical physicist.

In this book I will talk of physics addressing to readers who do not necessarily have a specific background in this field, but are nevertheless interested in discovering the novelty, the originality, and the possible weird implications of some amazing ideas used by modern physics of fundamental interactions. I will avoid introducing mathematical expressions as much as possible, trying to convey ideas rather than explaining formulas. Also, I will leave aside the cautious attitude typical of the academic style, following sometimes my excitement and my personal feelings concerning the topics under discussion.

We can say that this is a book of popular science, but of a rather unconventional type, as the emphasis is not only on what is known but also—and mainly—on what is still unknown. Indeed, many parts of the book are devoted to introduce and illustrate fundamental theoretical models and results which are potentially highly relevant to a deeper understanding of Nature, but still waiting to be directly confirmed (or disproved) by experimental observations. From this point of view the book may be of some interest also to professional physicists, working or not in the field of fundamental interactions.

I should explain, finally, the reason why the book is focused on the three topics mentioned in the title: gravity, strings, and particles. Why these three topics? What brings them together, selecting them among many other important issues of modern physical research?

It is known that there are many important links among them: for instance, as we shall see, the fact that a unified description of all elementary matter particles and all forces, including gravity, can be consistently achieved only within a model based on strings.

However, my choice is mainly motivated by the widespread belief that only a joint study of high-energy models of gravity, strings, and particles may help us to shed light on what seems to be (to me, at least) one of the biggest and most fascinating mysteries of modern science: besides time and three spatial dimensions, are there other dimensions in our Universe? If yes, how many are they?

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