Preface

After studying the Sun for 41 years (since receiving my degree in 1974), I have finally realized my dream of using my experience in this field to write a book. Why a book on the Sun? The Sun is our closest star and without it, life on Earth would cease to exist. Even though man has studied the Sun for centuries, there is still much to learn. At present there has been a "drop" in interest in solar physics; scientists saying that we know all there is to know, just like the ancient Greeks said to Socrates, but like them, today's scientists would be wrong. Our technology alone makes gaining insight into our Sun easier, and with motivated astronomers taking an interest in solar physics, our knowledge will grow and our lives on Earth will benefit.

The primary objective of the book is to illustrate the structure and evolution of the Sun, making the reader capable *of constructing a simplified model of it*. The final chapter is devoted to solar evolution. This selection of topics leaves solar activity phenomena out of the book. This is certainly an important loss, since solar activity, with its influence on the Earth, is the most researched field in solar physics today. However, the study of the solar structure and evolution represents a natural first step for a student moving from physics to astrophysics. He/she can understand how the Sun and stars basically work and, also, learn new concepts and methods, which are largely used in astronomy, in a coherent manner, that is, organized in one homogeneous subject and not scattered in many different topics.

Initially, I thought "*The Sun for almost everyone*" as a possible title of the book. This title was inspired by the book "*Physics for everyone*" by Landau and Kitaigorodskij, published by MIR, which I recently started reading again, rediscovering its great value, many years after my first reading. However, I realized that I could not write a book, which is intended to be at the university level, using only the four operations and minimizing the formulas, as the Russians did. Thus, I had to give up the initial title, even though I retained the aim of helping the reader as much as possible. I added a preliminary chapter with the basic physics to read the book. I tried to make the involved mathematics as clear as possible. In particular, I wrote all the steps necessary to get the formulas, so that the reader can proceed without recurring to pen and paper to perform further calculations. Moreover, instead of

referring to a preceding formula, I decided to rewrite the formula so as not to constrain the reader to browse the book losing the thread of the argument, but, on the contrary, in order to make reading the book as smooth as possible, like a novel.

I would like to express all my gratitude to the many persons I feel indebted to. Marcella Marconi helped me in improving many chapters of the book with her extensive comments. Scilla Degli Innocenti provided me with the unpublished solar evolutionary models by Senesi et al. Moreover, she, Vincenzo Andretta and Lucio Crivellari critically read through particular chapters. Stuart M. Jefferies, Colleen Jefferies, Carmen De Dominicis and Giovanna Monaco revised the English of a number of chapters. Massimo Della Valle contributed comments on a specific topic. Massimo Capaccioli, Elvira Covino, Juan Alcalà and John Leibacher critically read through preliminary parts of the book. Finally, the Editor of the series *Undergraduate Lecture Notes in Physics*, prof. Mike Inglis, helped me to see my original project in the right perspective.

This book is dedicated to my family and, in particular, to my wife, Albina, who has been to me like the Sun to the Earth.

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