

Foreword

I had the privilege of spending the academic year 1989–1990 as a visiting scientist in Claude Cohen-Tannoudji’s research group at the École Normale Supérieure in Paris. Laser cooling was still in its early stages and the atmosphere at ENS was electric. Nevertheless, one of my great pleasures was to actually leave the laboratory in Rue Lhomond in order to take the short walk across the 5th Arrondissement to the Collège de France, where I attended Claude’s weekly lectures on atomic physics. I recall thinking how fortunate I was to attend what were surely among the most clearly presented and thoughtfully constructed lectures ever given on the subject. The Collège de France requires that each year’s lectures be on a fresh subject and I was frankly envious of my Parisian friends who could attend every year and learn first hand how Claude understood some new topic in atomic physics. This volume, by Claude Cohen-Tannoudji and his younger colleague David Guéry-Odelin, brings the spirit and scope of those legendary lectures to the printed page.

Even in a book as substantial as this, the authors must make choices about what to include. In the selection of topics, in the choice of historic experiments to illustrate those topics, and in the choice of theoretical viewpoints to explain the science, Cohen-Tannoudji and Guéry-Odelin display consummate good scientific taste. The topics tie together key themes in atomic physics, like coherence and control, and highlight not just the famous experiments but those that best teach the concepts. The choice of references to other texts, reviews, and the primary literature, also displays wonderful scientific taste. Most importantly, the theoretical treatments have that characteristic Cohen-Tannoudji quality of clarity grounded in physical intuition. A particularly appealing aspect of the theoretical discussion is the authors’ commitment to providing multiple, alternative explanations of the same physical phenomenon. Such multiple physical models are invaluable

for generating the insights that lead to new directions in research, as well as in simply enhancing our pleasure at understanding the physical world.

The scope of this volume is remarkable, spanning the history of 20th century and early 21st century atomic physics and covering a range of topics that encompass the most rapidly progressing areas of research today. From the Hanle effect in the early 20th century (a pre-quantum mechanics manifestation of atomic coherence) to the latest experiments on quantum degenerate Bose and Fermi gases as model systems for the study of many-body physics, *Advances in atomic physics: an overview* delivers even more than its title suggests.

For young students just beginning an education in atomic physics to experienced researchers like myself who have lived through many of the exciting and still ongoing developments recounted here, and for all those in between, this book presents an inviting feast. Bon appétit!

William D. Phillips
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