Preface to the Fourth Edition

As I was writing this Fourth Edition of my book *Nonlinear Optics*, I found the opportunity to recall the history of my intrigue with the study of nonlinear optics. I first learned about nonlinear optics during my senior year at MIT. I was taking a course in laser physics taught by Dr. Abraham Szöke. A special topic covered in the course was nonlinear optics, and Prof. Bloembergen's short book on the topic (*Nonlinear Optics*, Benjamin, 1965) was assigned as supplemental reading. I believe that it was at that point in my life that I fell in love with nonlinear optics. I am attracted to nonlinear optics for the following reasons. This topic is founded on fundamental physics including quantum mechanics and electromagnetic theory. The laboratory study of nonlinear optics involves sophisticated experimental methods. Moreover, nonlinear optics spans the disciplines of pure physics, applied physics, and engineering.

In preparing this Fourth Edition, I have corrected some typos that made their way into the Third Edition. I also tightened up and clarified the wording in many spots in the text. In addition, I added new material as follows. I added a new chapter, Chapter 14, dealing with the nonlinear optics of plasmonic systems. In Chapter 2 I added a new section on advanced phase matching concepts. These concepts include noncollinear phase matching, critical and noncritical phase matching, phase matching aspects of spontaneous parametric downconversion, the tilted pulse-front method for THz generation, and Cherenkov phase matching. The first three sections of Chapter 13 as well as Section 13.8 have been substantially rewritten to improve the pedagogical structure. A new section (Section 13.7) has been added that deals with Keldysh theory and tunneling ionization. Section 4.6 now includes a simple derivation of the Debye–Hückel screening equation. Finally, at the level of detail, I have included the following new figures: Fig. 2.3.4, Fig. 2.10.2, Fig. 5.6.2, Fig. 7.5.2, and Fig. 7.5.4.

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