

Preface

During the past 10 years I had a good opportunity to watch the work of university graduates and young PhDs in optical laboratories. The strongest observation is how deep the gorge is, dividing theoretical knowledge acquired at university from the ability to make the simplest opto-electronic systems work. For example, a freshman knows perfectly well that if a laser beam is directed onto a photodetector, the latter must generate a signal. But often, it is far from the scope of the engineer that the flux may be too strong, jeopardizing the very life of an expensive device, or how to correctly extract that signal from a «black box» named photodetector. It is even more dangerous for the company when an inexperienced opto-electronic engineer is granted the power to purchase equipment for the project. How to make the right choice? Do I need any additional equipment to put the system into operation? Are my requirements professional? What exactly to request from the vendor? These and many others are the questions to be answered. Finally, after having been explaining such simple but numerous things to my colleagues for years, it occurred to me that a book could be the best solution. Initially, the book was conceived as a practical guide to the laboratory. However, it immediately occurred to me that the questions to be answered are not solely of the «How?» type, but are immediately followed by the questions «Why?». Therefore, theoretical background, on the scale of higher mathematics, also proved to be necessary.

The result of such a fusion of practice and theory is the present book, teaching how to create opto-electronic systems in the most efficient way, avoiding typical mistakes, and explaining the theoretical background necessary to realize practical limitations. It covers light detection techniques, imaging, interferometry, spectroscopy, modulation–demodulation, heterodyning, beam steering, and many other topics common to laboratory applications. The focus is on self-explanatory figures rather than on words. Therefore, the density of figures per page far exceeds the standards for technical publications. The book will guide the reader through the entire process of creating problem-specific opto-electronic system, starting from optical source, through beam transportation optical arrangement, to photodetector, and data acquisition system. But not only this: relevant basics of beam propagation and computer-based raytracing routines are also explained, and sample codes

listed. It will teach important know-how and practical tricks that are never disclosed in scientific publications, and protect from typical mistakes listed in the end of each chapter. I hope that the book will be the reader's personal advisor in the world of opto-electronics and navigator in the ocean called the market of optical components and systems.

The work on this book was intense, and I always received support from the Springer Senior Editor Dr. Claus Ascheron who represents the best traditions of this renowned publisher.

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