LASERS AND HOLOGRAPHY

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Dedicated to

BHAPPO

*"The Candle burns
and brightens those
that cause it to burn"*

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PREFACE

The coming of lasers and their use for holography marked an important era in the advancement of physical sciences. This generated diverse fields of activity and gave new life to well researched areas like Raman spectroscopy. Holography provided an excited medium for three dimensional display. Lasers and holography continue to find new areas of applications. Their use in industry, medicine, communication and instrumentation for analysis and measurement are now well established. Individually, the two subjects, Lasers and Holography, have been treated at length in the literature and excellent reviews are available. The present book covers both the areas in a comprehensive manner. It is not always easy to get an overall view of a modern discipline in the presence of vast literature scattered in journals, books, reports and conference proceedings. Our effort of presenting both lasers and holography in a single volume may therefore appear rather ambitious but we hope it will achieve its purpose of providing the essentials of the topics and application update in a fairly reasonable extent.

The subject of holography is still evolving and a number of new applications such as computer interconnects and in medicine are emerging fast. It simply depends on ones imagination to exploit the unique features of holograms. A complete treatment of such applications and their thorough understanding therefore need further developments in architectures, techniques and materials.

The first three chapters discuss the physics and technology of lasers, while chapter 4 deals with the principles and techniques of holography. The chapters 5 to 9 describe the applications. The applications in the areas of medicine, information processing, nondestructive testing and interconnections have been included for their relevance in the context of recent developments.

In writing the book a large number of original publications have been used. However, the references cited do not represent the complete bibliography on the subject. Only those references are listed which have been used for writing the book. It is natural in such a book that many important publications may have been left unintentionally, for which

the authors regret.

The book aims for a readership of those studying for a Master's degree in Applied Optics, Lasers and Holography and requiring an understanding of the generation and use of coherent optical radiation. The book will be useful to students, researchers and professionals actively involved in the development of lasers, holography and their applications. It is hoped that the students and researchers would find it useful and interesting.

One of the authors (PCM) is grateful to Dr O.P. Nijhawan, Director, IRDE, Dehra Dun for helpful suggestions. The authors are also thankful to Mr. Devendra Mohan, Mr. K.S.S. Rao, Mr. Chandra Bhan and Mr. Pritam Lal for providing some of the photographs used in the book. We take great pleasure in acknowledging the valuable help of Dr R.K. Tyagi and Mr. A.K. Musla for their critical reading of the manuscript. We wish to specially thank Mr. R.K. Kukreti for his patience and skill in typing. We are obliged to Mr. A.K. Musla for his painstaking efforts in type setting all the equations and tables, and formatting the manuscript in the computer for laser printing. Finally, we express our appreciation to the World Scientific Publishing Company for the high quality of publication.

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May 19, 1993.

P.C. Mehta
V.V. Rampal

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