

# Topics in Applied Physics

Volume 1

## Dye Lasers

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# Dye Lasers Topics In Applied Physics

**Valerii Ter-Mikirtychev**



## **Dye Lasers Topics In Applied Physics:**

Dye Lasers: 25 Years Michael Stuke, 2005-08-05 In Dye Lasers 25 years the pioneers and leading experts in the field of dye lasers present the current status and bright future perspectives of dye lasers and their applications in physics and chemistry Particular topics covered include new sources of ultrashort pulses novel aspects of resonator design and imaging for femtosecond lasers amplification schemes to terawatt intensity regimes optics and high resolution spectroscopy of atoms and molecules and electro optic and plasma physics applications of ultrashort and ultra intense laser pulses Since its invention in 1966 the dye laser has revolutionized many fields of science and technology Questions of fundamental interest in physics and chemistry can now be answered it is possible to test fundamental quantum physics in single atom experiments and regioselective photochemistry in complexes can be monitored directly using dye laser diagnostic methods In this book the latest results and most recent references are presented for new sources of ultrashort pulses from the visible to the VUV together with experimental details of ultrahigh resolution spectroscopy of atoms and molecules laser diagnostics of the dynamics of elementary chemical reactions and ultrahigh intensity sources for laser target interaction **Dye Lasers** F.P. Schäfer, 2013-04-17 VI spectrum of potential applications is outlined by T W HANSCH who also touches briefly on the exciting field of laser spectroscopy a most important application to which a forthcoming volume is devoted The treatment being tutorial in nature is suitable both for graduate students and for scientists working in the dye laser field or applying a dye laser in another research discipline The book will also prove to be an indispensable and handy source of information for the specialist The literature is reviewed up to spring 1973 and the list of additional references which cites the titles of articles extends to summer 1973 This is proof of an amazingly short publication period for a 300 page book Heidelberg October 1973 HELMUT K V LOTSCH Contents 1 Principles of Dye Laser Operation By FRITZ P SCHAFER with 53 Figures Historical 1 Organization of the Book 5 1 1 General Properties of Organic Compounds 6 1 2 Light Absorption by Organic Dyes 9 1 3 Deactivation Pathways for Excited Molecules 28 1 4 Laser Pumped Dye Lasers 32 1 4 1 Oscillation Condition 32 1 4 2 Practical Pumping Arrangements 37 1 4 3 Time Behavior and Spectra 44 1 5 Flashlamp Pumped Dye Lasers 54 1 5 1 Triplet Influence 54 1 5 2 Practical Pumping Arrangements 60 1 5 3 Time Behavior and Spectra 64 1 6 Wavelength Selective Resonators for Dye Lasers 66 1 7 Dye Laser Amplifiers 79 1 8 Outlook 83 2 Continuous Wave Dye Lasers By B B *Dye Lasers: 25 Years* Michael Stuke, 2014-04-17 In Dye Lasers 25 years the pioneers and leading experts in the field of dye lasers present the current status and bright future perspectives of dye lasers and their applications in physics and chemistry Particular topics covered include new sources of ultrashort pulses novel aspects of resonator design and imaging for femtosecond lasers amplification schemes to terawatt intensity regimes optics and high resolution spectroscopy of atoms and molecules and electro optic and plasma physics applications of ultrashort and ultra intense laser pulses Since its invention in 1966 the dye laser has revolutionized many fields of science and technology Questions of fundamental interest in physics and

chemistry can now be answered it is possible to test fundamental quantum physics in single atom experiments and regioselective photochemistry in complexes can be monitored directly using dye laser diagnostic methods In this book the latest results and most recent references are presented for new sources of ultrashort pulses from the visible to the VUV together with experimental details of ultrahigh resolution spectroscopy of atoms and molecules laser diagnostics of the dynamics of elementary chemical reactions and ultrahigh intensity sources for laser target interaction

**Dye Lasers** Fritz P. Schäfer, 1990-01-22 The third edition of Dye Lasers has been prepared in response to demand for an updated version of this well known Topics volume The classic chapters on continuous wave dye lasers and properties of dye lasers are unchanged but are now complemented by an additional chapter on continuous wave dye lasers that takes account of recent advances The chapters on principles of operation and mode locking of dye lasers have been updated Finally the chapter on applications which was originally written when a synopsis was still possible has been eliminated completely in this edition since nowadays dye lasers have penetrated almost all fields of science and technology and applications have become innumerable In its place there is a new chapter on wavemeters This book provides an excellent introduction to dye lasers and contains much useful information for scientists and engineers who deal with their applications

**Tunable Lasers** Jonathan C. White, Linn F. Mollenauer, 2013-03-14 Ever since the invention of the laser itself the spectroscopist has dreamed of lasers that could be tuned continuously over whatever set of resonances he wished to study Two developments of the mid 1960s the optical parametric oscillator and the dye laser were the first to begin to fulfill that dream The cw dye laser with its ability to produce extremely narrow linewidths was particularly successful and revitalized the study of atomic physics Other complementary developments soon followed These included the excimer color center and high pressure gas lasers as well as Raman shifting and four wave mixing techniques for further extending the tuning ranges of such primary tunable laser sources By the end of the 1970s continuously or quasi continuously tunable coherent sources were thus available for the visible and the near infrared and a good part of the ultraviolet and the far infrared Despite the existence of a number of excellent treatises on individual technologies to the best of our knowledge no one has yet attempted to survey the entire field of tunable lasers in a single volume The purpose of this book is to fill that void It is particularly aimed at those who are not necessarily laser experts but who may wish to discover quickly and with a minimum of effort the best technology to satisfy a particular problem and what the possibilities and limitations of that technology are

**Lasers and Current Optical Techniques in Biology** Giuseppe Palumbo, Riccardo Pratesi, 2007-10-31 The introduction of innovative light sources fibre laser sources and light emitting diodes is opening unexpected perspectives into optical techniques and is promising new exciting applications in the field of biomedicine Lasers and Current Optical Techniques in Biology aims to provide an overview of light sources together with an extensive and authoritative description of the optical techniques in bio medicine This book is designed to give biomedical researchers a strong feel for the capability of physical approaches promote new

interdisciplinary interests and persuade more practitioners to take advantage of optical techniques Current developments in a variety of optical techniques including Near Infra Red Spectroscopy and traditional and advanced fluorescence techniques are covered ranging from those that are becoming common practice to those that need much more experimentation before they can be accepted as real breakthroughs Further topics include optical coherence tomography and its variations polarised light imaging and principle laser and lamp sources a usually fragmentary topic often dispersed among specialist publications The wide range of topics covered make Lasers and Current Optical Techniques in Biology of interest to a diverse range of scientific communities *High-Power Lasers and Applications* K.-L. Kompa,H. Walther,2013-04-17 The High Power Lasers and Applications Conference was held in Munich June 20 22 1977 The conference took place simultaneously with the Laser 77 International Congress and Trade Fair at the Munich Fair Ground The meeting was a continuation of a series of colloquia on elec tronic transition lasers previously held in the United States The main topics of the conference were high power VUV UV visible and IR la sers including an analysis of laser systems technology and laser con cepts Also some applications to nonlinear optics chemical kinetics and spectroscopy particularly with respect to isotope separation were discussed The conference was attended by 95 scientists representing Austria Canada England Finland Germany FRG Germany GDR France Israel Italy The Netherlands and the U S A The organizers acknowledge financial support from the Deutsche Forschungs gemeinschaft the U S Air Force Office of Scientific Research the U S Air Force European Office of Aerospace Research and Development EOARD and the U S Army European Research Office as well as from the companies Coherent Radiation Spectra Physics and Cryophysics Furthermore we thank our colleagues Dr Steven N Suchard and Professor Jeffrey I Steinfeld for coordinating the U S contribution to the conference We are grateful to Frau Maischberger for administrative assistance

**Lasers in Polymer Science and Technology** Jan F. Rabek,Jean-Pierre Fouassier,1989-11-30 The purpose of this 4 volume book is to examine some of the applications of lasers in polymer science and technology Now available for the first time up to date information on this fascinating subject is compiled and presented in compact form This book focuses on current research and developments in the application of lasers in polymer and biopolymer chemistry It includes experimental and theoretical details apparatus techniques and applications This book is a useful source for researchers students polymer chemists and physicists involved in this astonishing field of high technology Tunable Lasers and Applications A. Mooradian,T. Jaeger,P. Stokseth,2013-06-29 The Tunable Lasers and Applications Conference was held in Loen Norway on June 6 11 1976 This conference dealt with the technology of tunable lasers from the vacuum ultraviolet to the far infrared and their application in the areas of photochemistry chemical kinetics isotope separation at mospheric photochemistry and environmental studies photobiology and spec troscopy The need for such a conference grew out of the rapidly expanding use of tunable lasers in a broad range of disciplines The conference was attended by 130 scientists representing Japan Italy West Germany Canada Israel France England Norway Sweden Brazil Den mark Finland the Netherlands the Soviet Union and the

United States The location of the conference in Loen Nordfjord was chosen because of the magnificent beauty of its aqua blue fjords surrounded by glacier capped mountains and lush green hillsides The Alexandra Hotel was a perfect host for such a conference with first class services superb smorgesbord and excellent audio visual facilities The atmosphere was free of distractions and provided for a relaxed interchange of ideas An afternoon hike was arranged to the Briksdal glacier while the highlight of the outdoor activities was a bus ship excursion to the magestically splendid Geiranger fjord A sumptuous banquet was followed by an interesting and entertaining illustrated talk on high speed and underwater photography by Professor Harold Edgerton from MIT Financial support from our sponsors is gratefully acknowledged in helping to make this conference a complete success

**Laser Spectroscopy III** J. L. Hall, J. L. Carlsten, 2013-12-30 The Industrial Laser Handbook David Belforte, Morris Levitt, 2012-12-06 Manufacturing with lasers is becoming increasingly important in modern industry This is a unique most comprehensive handbook of laser applications to all modern branches of industry It includes along with the theoretical background updates of the most recent research results practical issues and even the most complete company and product directory and supplier's list of industrial laser and system manufacturers Such important applications of lasers in manufacturing as welding cutting drilling heat treating surface treatment marking engraving etc are addressed in detail from the practical point of view A list of specific companies dealing with manufacturing aspects with lasers is given

High-Power Dye Lasers Francisco J. Duarte, 2013-04-17 High power dye lasers provide a versatile tool in many scientific industrial and medical applications This book offers an up to date and practical guide to the physics and technology of these lasers for all those designing building and using such systems Individual topics include dispersive resonators signal amplification and dye laser pumping by excimer lasers copper vapor lasers and flashlamps

Excimer Lasers C. K. Rhodes, Charles A. Brau, C.K. Rhodes, 1984 **Low Threshold Organic Thin Film Laser Devices** Christian Karnutsch, 2007 Dye Laser Principles Frank J. Duarte, Lloyd William Hillman, 1990 A tutorial introduction to the field of dye lasers Dye Laser Principles also serves as an up to date overview for those using dye lasers as research and industrial tools A number of the issues discussed in this book are pertinent not only to dye lasers but also to lasers in general Most of the chapters in the book contain problem sets that expand on the material covered in the chapter Key Features Dye lasers are among the most versatile and successful laser sources currently available in use Offering both pulsed and continuous wave operation and tunable from the near ultraviolet to the near infrared these lasers are used in such diverse areas as industrial applications medical applications military applications large scale laser isotope separation fundamental physics spectroscopic techniques laser radar

*Selected Papers on Tunable Solid-state Lasers* Valerii Ter-Mikirtychev, 2002 This work includes key papers from the world literature covering important discoveries and developments in optics

*Laser Crystals* A. A. Kaminskii, 2013-12-19 The greatest reward for an author is the feeling of satisfaction he gets when it becomes clear to him that readers find his work useful After my book appeared in the USSR in 1975 I received many letters from

fellow physicists including colleagues from Western European countries and the USA Some of those letters as well as official reviews of the book made specific suggestions for improving the book The satisfaction I derived from all those kind and warm responses gave me the determination to continue work on the book in order to fulfill these wishes in the next edition This possibility arose when one of the scientific editors from Springer Verlag Heidelberg H Latsch who is the founder of the well known series of quasi monographs Topics in Applied Physics visited our Institute and suggested an English edition of my book For all this and for his subsequent help I am sincerely thankful I consider it my pleasant duty also to express my gratitude to the American physicist H F Ivey who served as scientific editor of the translation The English version of the book retains the structure of the Russian edition though it is supplemented with many new data in the tables and figures It reflects trends in the development of the physics and spectroscopy of laser crystals in recent years *Ultrashort Laser Pulses and Applications* Wolfgang Kaiser,2013-03-14 Ten years ago Stanley L Shapiro edited the book entitled Ultrashort Light Pulses Topics Appl Phys Vol 18 which was written by eight experts in the field Six years later Charles V Shank added a bibliography 1980 1983 in the second edition with approximately one thousand new references During the past decade the field has grown so rapidly that a completely new book had to be written In particular the reduction of the time scale of light pulses into the femtosecond range has opened up new experimental possibilities never even foreseen in the preceding literature The vast literature with countless ideas and applications makes it impossible for a single person to write a comprehensive review Nine scientists actively working in the field since its beginning have decided to join forces to prepare a new book describing the present state of the art Emphasis is placed on the generation and numerous applications of ultrashort laser pulses This book covers a wide area of science physics engineering chemistry and biology The various chapters and sections are prepared in each case such that the reader is given a brief introduction to the specific subject Ample references for a more detailed study are given at the end of each chapter **Monographic Series** Library of Congress,1974 **Laser Remote Sensing** Raymond M. Measures,1984 Presents a concise self contained monograph on laser remote sensing and its applications Discusses the ways in which lasers can be used to remotely measure the atmosphere and the hydrosphere Provides an historical perspective and reviews the basic physics needed

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