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laser spectroscopy is a valuable tool for sensing and chemical analysis developments in lasers detectors and mathematical analytical tools have led to improvements in the sensitivity and selectivity of spectroscopic techniques and extended their fields of application laser spectroscopy for sensing examines these advances and how laser spectroscopy can be used in a diverse range of industrial medical and environmental applications part one reviews basic concepts of atomic and molecular processes and presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation in addition it explains the selectivity sensitivity and stability of the measurements the construction of databases and the automation of data analysis by machine learning part two explores laser spectroscopy techniques including cavity based absorption spectroscopy and the use of photo acoustic spectroscopy to acquire absorption spectra of gases and condensed media these chapters discuss imaging methods using laser induced fluorescence and phosphorescence spectroscopies before focusing on light detection and ranging photothermal spectroscopy and terahertz spectroscopy part three covers a variety of applications of these techniques particularly the detection of chemical biological and explosive threats as well as their use in medicine and forensic science finally the book examines spectroscopic analysis of industrial materials and their applications in nuclear research and industry the text provides readers with a broad overview of the techniques and applications of laser spectroscopy for sensing it is of great interest to laser scientists and engineers as well as professionals using lasers for medical applications environmental applications military applications and material processing presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation explores laser spectroscopy techniques including cavity based absorption spectroscopy and the use of

photo acoustic spectroscopy to acquire absorption spectra of gases and condensed media considers spectroscopic analysis of industrial materials and their applications in nuclear research and industry

since the initial laser beam in 1960 use of lasers has mushroomed opening new frontiers in medicine manufacturing communications defense and information storage and retrieval lasers invention to application brings together a series of chapters by eminent scientists spanning the broad range of today s laser technology

photonic laser propulsion offers a thrilling glimpse into the future of rapid mass space transportation by surveying one of the most significant breakthrough technologies to overcome the limitations of current propulsion systems based on conventional rocketry written by the pioneer of photonic laser propulsion plp this book strives to establish a strong foundational understanding while exploring advanced theoretical concepts readers are guided through quantum mechanics optical resonators and radiation pressure that underpin this revolutionary thrust mechanism to then be offered past experimental milestones and cutting edge demonstrations that trace its evolution and validate its feasibility a presentation of current application examples as well as long term development pathways for interplanetary commutes and interstellar probes conclude the excursus fostering curiosity and charting a course for further research exploration in this dynamic realm researchers both in academia and industry and a host of other technical audiences at all levels will think of this volume which consolidates a growing body of knowledge surrounding plp as a key resource for their study or work to enable innovative space endeavors including human civilization s expansion within our solar system or interstellar exploration covers plp thoroughly from theoretical foundations and principles to a wide range of applications including mass space transportation includes industry relevant insights to integrate this revolutionary propulsion technology into ongoing and future space projects features case studies and methods designed to enhance technical understanding and facilitate real world applications features engaging accessible content that also appeals to space enthusiasts science communicators and policy makers regardless of their technical or scientific background

annotation lasers is both a text and general reference book with an emphasis on basic laser principles and theory the book is for all scientists and engineers who work with lasers

self focusing has been an area of active scientific investigation for nearly 50 years this book presents a comprehensive treatment of this topic and reviews both theoretical and experimental investigations of self focusing this book should be of interest to scientists and engineers working with lasers and their applications from a practical point of view self focusing effects impose a limit on the power that can be transmitted through a material medium self focusing also can reduce the threshold for the occurrence of other

nonlinear optical processes self focusing often leads to damage in optical materials and is a limiting factor in the design of high power laser systems but it can be harnessed for the design of useful devices such as optical power limiters and switches at a formal level the equations for self focusing are equivalent to those describing bose einstein condensates and certain aspects of plasma physics and hydrodynamics there is thus a unifying theme between nonlinear optics and these other disciplines one of the goals of this book is to connect the extensive early literature on self focusing filament ation self trapping and collapse with more recent studies aimed at issues such as self focusing of fs pulses white light generation and the generation of filaments in air with lengths of more than 10 km it also describes some modern advances in self focusing theory including the influence of beam nonparaxiality on self focusing collapse this book consists of 24 chapters among them are three reprinted key landmark articles published earlier it also contains the first publication of the 1964 paper that describes the first laboratory observation of self focusing phenomena with photographic evidence

the use of laser based manipulation tools has literally exploded on the cell biology and molecular pathology scene resulting in as many different laser micromanipulation systems as there are people using them laser manipulation of cells and tissues ties all these systems and studies together describing all of the different kinds of research and practical analytical applications of laser manipulation it also provides the reader with the basic information needed to actually build one s own laser micro manipulation system the combination of imaging and molecular probe technology with laser micromanipulation greatly extends the use of this technology in molecular cellular developmental and patho biology medicine this book should be valuable to scientists clinicians and students in the fields of cell and developmental biology cell physiology cancer biology pathology and stem cell biology devotes four chapters to laser catapulting and capture of dna and other cellular material for biochemical analysis a major use of this technology that has been adapted for molecular pathology both in clinical medicine and research discusses the theory of laser tweezers optical tweezers and its application to novel problems in biology covers topics on optoporation getting things into cells uncaging of molecules and the ability to collect and analyze nanomolar amounts of cell material by an array of biochemical physical tools of particular interest to cell biologists and drug discovery researchers

over the past two decades the use of fiber lasers in engineering applications has gradually become established as an engineering discipline on its own the development of fiber lasers is mainly the result of studies from various domains like photonics optical sensing fiber optics nonlinear optics and telecommunication though many excellent books exist on each of these subjects and several have been written specifically to address lasers and fiber lasers it is still difficult to find one book where the diverse core of subjects that are central to the study of fiber laser systems are presented in simple

and straight forward way fiber lasers fundamentals with matlab modelling is an introduction to the fundamentals of fiber lasers it provides clear explanations of physical concepts supporting the field of fiber lasers fiber lasers characteristics are analyzed theoretically through simulations derived from numerical models the authors cover fundamental principles involved in the generation of laser light through both continuous wave cw and pulsing it also covers experimental configuration and characterization for both cw and q switching the authors describe the simulation of fiber laser systems and propose numerical modelling of various fiber laser schemes matlab modelling and numerical computational methods are used throughout the book to simulate different fiber laser system configurations this book will be highly desirable and beneficial for both academics and industry professionals to have ample examples of fiber laser approaches that are well thought out and fully integrated with the subjects covered in the text this book is written to address these needs

optical frequency combs trends in sources and applications offers an overview of the recent advances on the physics sources and applications of optical frequency comb technology one of the most exciting and fast developing research fields in photonics the book aims at showcasing recent advances through contributions by key players in a multifaceted research ecosystem and at the same time at providing a valuable service to the community by offering an as much comprehensive as possible review which at the same time highlights challenges to be solved and promising future directions the main topics covered include i an overview of different platforms for optical frequency combs generation as fibre lasers quantum cascade lasers integrated microresonators and waveguides fibre resonators electro optic modulators and nonlinear fibres multicore fibres ii a selection of applications in different technologies including sensing spectroscopy precision metrology and optical clocks microscopy radio frequency generation distance ranging and optical communications iii a diverse range of physical methods for frequency comb generation such as modulation laser mode locking techniques dissipative solitons and parametric gain in nonlinear resonators nonlinear spectral broadening and supercontinuum formation in waveguides this book will be a valuable resource for academics researchers and postgraduate students working and interested in the field optical frequency combs and more broadly in photonic technologies too key features edited by authorities in the field with chapter contributions from subject area leading experts in academia and industry up to date with the latest technological developments applications and fundamental research from the field describes comb properties depending on source and generation platform and comb specifications matching to application needs

the 23 rd international free electron laser conference and the 8 th fel users workshop were held on august 20 24 th 2001 at the technische universitat darmstadt tud in germany this conference is one of a series of fel conferences administered by an

international executive committee it was organized by the institute of nuclear physics of the tudd at which in 1996 the first free electron laser in germany went into operation the super conducting darmstadt electron linear accelerator

the 12th beam instrumentation workshop addressed design principles and engineering issues of beam diagnostics and control instrumentation for charged particle accelerators and beam transport lines the workshop provided a forum in which participants could exchange ideas and review instrumentation designs and served as an introduction to relevant topics for engineers and scientists with the aid of tutorial sessions

interest in nanoporous crystals as host guest systems has risen dramatically over the past few years such that this fascinating class of substances now plays an important role not only in material sciences but also in numerous other disciplines such as organic or supramolecular chemistry with their unique characteristics nanoporous crystals offer a wide range of possible applications they are used as molecular sieves or membranes as well as catalytic converters this work presents the very first overview of this exciting field readers will find everything they need to know about these unusual materials with all their many attributes synthesis of host guest systems description of the structural and dynamic aspects electronic and optical characteristics of the materials possible applications an indispensable reference for materials scientists as well as for catalytic and inorganic chemists and all those working in the field

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