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Bose-Einstein Condensation Bose-Einstein Condensation and Superfluidity Bose-Einstein Condensation Fundamentals and New Frontiers of Bose-Einstein Condensation Bose-Einstein Condensation and Superfluidity Bose-Einstein Condensation in Dilute Gases Bose-Einstein Condensation in Dilute Gases Universal Themes of Bose-Einstein Condensation Bose-Einstein Condensation of Excitons and Biexcitons Bose-Einstein Condensation of Molecules Bose Einstein Condensation of Excitons and Polaritons Proceedings of the Thirteenth Physics Summer School Bose-Einstein Condensates Emergent Nonlinear Phenomena in Bose-Einstein Condensates Bose-Einstein Condensation in Atomic Gases Bose-Einstein Condensation in Dilute Gases Bose-Einstein Condensation in Dilute Gases Bose-Einstein Condensation in Nonlinear System Condensazione Di Bose-Einstein Nei Gas Atomici Poincare Seminar 2003 Dipole-dipole interaction in a degenerate quantum gas Many-Body Schrödinger Dynamics of Bose-Einstein Condensates The Mathematics of the Bose Gas and its Condensation Bose-Einstein Condensates and Atom Lasers Excitations in a Bose-condensed Liquid Bose-Einstein Condensation Lasers and Their Application to the Observation of Bose-Einstein Condensates Laser and Bose-Einstein Condensation Physics Transport and Turbulence in Quasi-Uniform and Versatile Bose-Einstein Condensates Problems of Condensed Matter Physics Bose-Condensed Gases at Finite Temperatures Lasers and Their Application to the Observation of Bose-Einstein Condensates Physics of Quantum Fluids Superfluid States of Matter Experiments on Bose-Einstein Condensation Bose-Einstein condensation and quantized flow of microcavity polaritons with long lifetime Evolution from BCS super-conductivity to Bose-Einstein condensation and infrared behavior of the bosonic limit Polariton Physics Models and Methods for Quantum Condensation and Fluids OSA Trends in Optics and Photonics on Ultracold Atoms and Bose-Einstein-condensation

Bose-Einstein Condensation 1996-12 among the most remarkable effects that quantum mechanics adds to the catalog of the thermal properties of matter is condensation of an ideal gas of identical particles into a single quantum state the principle of which was discovered in the theory of statistical mechanics by bose and einstein in the 1920s bose einstein condensation bec is a mechanism for producing a macroscopic quantum system and is exemplary of the macroscopic quantum phenomena of superconductivity and superfluidity these 15 papers provide an introduction to current work on bec

Bose-Einstein Condensation and Superfluidity 2008 bose einstein condensation represents a new state of matter and is one of the cornerstones of quantum physics resulting in the 2001 nobel prize providing a useful introduction to one of the most exciting field of physics today this text will be of interest to a growing community of physicists and is easily accessible to non specialists alike

Bose-Einstein Condensation 2003-04-03 this book covers the fundamentals of and new developments in gaseous bosendash einstein condensation it begins with a review of fundamental concepts and theorems and introduces basic theories describing bose einstein condensation bec it then discusses some recent topics such as fast rotating bec spinor and dipolar bec low dimensional bec balanced and imbalanced fermionic superfluidity including bcs bec crossover and unitary gas and p wave superfluidity

Fundamentals and New Frontiers of Bose-Einstein Condensation 2010 ultracold atomic gases is a rapidly developing area of physics that attracts many young researchers around the world written by world renowned experts in the field this book gives a comprehensive overview of exciting developments in bose einstein condensation and superfluidity from a theoretical perspective the authors also make sense of key experiments from the past twenty years with a special focus on the physics of ultracold atomic gases these systems are characterized by a rich variety of features which make them similar to other important systems of condensed matter physics like superconductors and superfluids at the same time they exhibit very peculiar properties which are the result of their gaseous nature the possibility of trapping in a variety of low dimensional and periodical configurations and of manipulating the two body interaction the book presents a systematic theoretical description based on the most successful many body

approaches applied both to bosons and fermions at equilibrium and out of equilibrium at zero as well as at finite temperature both theorists and experimentalists will benefit from the book which is mainly addressed to beginners in the field master students phd students young postdocs but also to more experienced researchers who can find in the book novel inspirations and motivations as well as new insightful connections building on the authors first book bose einstein condensation oxford university press 2003 this text offers a more systematic description of fermi gases quantum mixtures low dimensional systems and dipolar gases it also gives further emphasis on the peculiar phenomenon of superfluidity and its key role in many observable properties of these ultracold quantum gases

Bose-Einstein Condensation and Superfluidity 2016-01-21 since an atomic bose einstein condensate predicted by einstein in 1925 was first produced in the laboratory in 1995 the study of ultracold bose and fermi gases has become one of the most active areas in contemporary physics this book explains phenomena in ultracold gases from basic principles without assuming a detailed knowledge of atomic condensed matter and nuclear physics this new edition has been revised and updated and includes new chapters on optical lattices low dimensions and strongly interacting fermi systems this book provides a unified introduction to the physics of ultracold atomic bose and fermi gases for advanced undergraduate and graduate students as well as experimentalists and theorists chapters cover the statistical physics of trapped gases atomic properties cooling and trapping atoms interatomic interactions structure of trapped condensates collective modes rotating condensates superfluidity interference phenomena and trapped fermi gases problems are included at the end of each chapter

Bose-Einstein Condensation in Dilute Gases 2008-09-11 problems after each chapter

Bose-Einstein Condensation in Dilute Gases 2002 covering general theoretical concepts and the research to date this book demonstrates that bose einstein condensation is a truly universal phenomenon

Universal Themes of Bose-Einstein Condensation 2017-04-27 bose einstein condensation of excitons is a unique effect in which the electronic states of a solid can self organize to acquire quantum phase coherence the phenomenon is closely linked to bose einstein condensation in other systems such as liquid helium and laser cooled

atomic gases this is the first book to provide a comprehensive survey of this field covering theoretical aspects as well as recent experimental work after setting out the relevant basic physics of excitons the authors discuss exciton phonon interactions as well as the behaviour of biexcitons they cover exciton phase transitions and give particular attention to nonlinear optical effects including the optical stark effect and chaos in excitonic systems the thermodynamics of equilibrium quasi equilibrium and nonequilibrium systems are examined in detail the authors interweave theoretical and experimental results throughout the book and it will be of great interest to graduate students and researchers in semiconductor and superconductor physics quantum optics and atomic physics

Bose-Einstein Condensation of Excitons and Biexcitons 2000-02-28

this reference book explains the fundamentals of bose einstein condensation bec in excitons and polaritons it presents five chapters exploring fundamental concepts and recent developments on the subject starting with a historical overview of bec the book progresses into the origins and behaviors of excitons and polaritons chapters also cover the unique thermalization and relaxation kinetics of excitons and the distinctive features of polaritons such as lasing superfluidity and quantized vortices the chapters dedicated to bec in excitons and polaritons detail experimental techniques theoretical modeling recent advancements and practical applications in a simplified way for beginners this book serves as a resource for researchers physicists and students interested in the phenomena of bec providing insights into both the theoretical foundations and the practical implications of excitons and polaritons

Bose-Einstein Condensation of Molecules 2005 bose einstein condensation of dilute gases is an exciting new field of interdisciplinary physics the eight chapters in this volume introduce its theoretical and experimental foundations the authors are lucid expositors who have also made outstanding contributions to the field they include theorists tony leggett allan griffin and keith burnett and nobel prize winning experimentalist bill phillips in addition to the introductory material there are articles treating topics at the forefront of research such as experimental quantum phase engineering of condensates the superchemistry of interacting atomic and molecular condensates and atom laser theory

Bose Einstein Condensation of Excitons and Polaritons 2024-02-22 a bose einstein condensate bec is a state of matter of a dilute gas of weakly interacting bosons confined in an external potential and cooled to temperatures very near to absolute zero 0 k or 273 15 c under such conditions a large fraction of the bosons occupy the lowest quantum state of the external potential at which point quantum effects become apparent on a macroscopic scale this book gathers and presents research in this field including a new approach to spinor bose einstein condensates elliptic vortices in self attractive bose einstein condensates and matter wave dark solitons in optical superlattices as well as the mathematical description of the effective behavior of one dimensional bose einstein condensates with defects

Proceedings of the Thirteenth Physics Summer School 2000 this book written by experts in the fields of atomic physics and nonlinear science covers the important developments in a special aspect of bose einstein condensation namely nonlinear phenomena in condensates topics covered include bright dark gap and multidimensional solitons vortices vortex lattices optical lattices multicomponent condensates mathematical methods rigorous results and the beyond the mean field approach

Bose-Einstein Condensates 2010 although first proposed by einstein in 1924 bose einstein condensation bec in a gas was not achieved until 1995 when using a combination of laser cooling and trapping and magnetic trapping and evaporation it was first observed in rubidium and then in lithium and sodium cooled down to extremely low temperatures this book brought together many leaders in both theory and experiment on bose einstein condensation in gases their lectures provided a detailed coverage of the experimental techniques for the creation and study of bec as well as the theoretical foundation for understanding the properties of this novel system this volume provides the first systematic review of the field and the many developments that have taken place in the past three years

Emergent Nonlinear Phenomena in Bose-Einstein Condensates

2007-12-29 bose einstein condensation was discovered in atomic gas systems where bose condensate occupies 100 of the total system at zero temperature liquid helium systems have been investigated based on the landau theory where the superfluid component of liquid helium is background flow according to the landau theory it is doubtful that the

superfluid component is a bose condensate in experiments the probability of helium atoms with zero momentum is a few percent of the total liquid helium at ultra low temperatures however the superfluid component occupies 100 of the liquid helium at zero temperature as macroscopic observations indicate this book introduces a quasi particle representing an eigenstate of the total hamiltonian

Bose-Einstein Condensation in Atomic Gases 1999 although first proposed by einstein in 1924 bose einstein condensation bec in a gas was not achieved until 1995 when using a combination of laser cooling and trapping and magnetic trapping and evaporation it was first observed in rubidium and then in lithium and sodium cooled down to extremely low temperatures this book brought together many leaders in both theory and experiment on bose einstein condensation in gases their lectures provided a detailed coverage of the experimental techniques for the creation and study of bec as well as the theoretical foundation for understanding the properties of this novel system this volume provides the first systematic review of the field and the many developments that have taken place in the past three years

Bose-Einstein Condensation in Dilute Gases 1997 the poincarè seminar is held twice a year at the institute henri poincarè in paris the goal of this seminar is to provide up to date information about general topics of great interest in physics both the theoretical and experimental results are covered with some historical background particular care is devoted to the pedagogical nature of the presentation this volume contains the lectures of the third and fourth poincarè seminar both held in 2003 the third one is devoted to bose einstein condensation it covers the physics of superfluid liquid helium as well as the recently discovered atomic bose einstein condensates major experimental results are presented together with relevant theoretical approaches and remaining open questions the fourth one concentrates on entropy giving a comprehensive account of the history and various realizations of this concept from thermodynamics to black holes and including theoretical and experimental discussions of the corresponding fluctuations for mesoscopic systems near equilibrium contributing authors roger balian sèbastien balibar claude cohen tannoudji jean dalibard thibault damour olivier darrigol christian maes philippe nozières fèlix ritort christophe salomon gora v shlyapnikov

Bose-Einstein Condensation in Dilute Gases 2002 at extremely low temperatures clouds of bosonic atoms form what is known as a bose

einstein condensate recently it has become clear that many different types of condensates so called fragmented condensates exist in order to tell whether fragmentation occurs or not it is necessary to solve the full many body schrödinger equation a task that remained elusive for experimentally relevant conditions for many years in this thesis the first numerically exact solutions of the time dependent many body schrödinger equation for a bosonic josephson junction are provided and compared to the approximate gross pitavskii and bose hubbard theories it is thereby shown that the dynamics of bose einstein condensates is far more intricate than one would anticipate based on these approximations a special conceptual innovation in this thesis are optimal lattice models it is shown how all quantum lattice models of condensed matter physics that are based on wannier functions e g the bose fermi hubbard model can be optimized variationally this leads to exciting new physics

Bose-Einstein Condensation in Nonlinear System 2011 this book contains a unique survey of the mathematically rigorous results about the quantum mechanical many body problem that have been obtained by the authors in the past seven years it addresses a topic that is not only rich mathematically using a large variety of techniques in mathematical analysis but is also one with strong ties to current experiments on ultra cold bose gases and bose einstein condensation the book provides a pedagogical entry into an active area of ongoing research for both graduate students and researchers it is an outgrowth of a course given by the authors for graduate students and post doctoral researchers at the oberwolfach research institute in 2004 the book also provides a coherent summary of the field and a reference for mathematicians and physicists active in research on quantum mechanics

Condensazione Di Bose-Einstein Nei Gas Atomici 1999 proceedings of the international school of quantum electronics 27th course on bose einstein condensates and atom lasers october 19 24 1999 erice italy since the experimental demonstration of bose einstein condensation in dilute atomic gases there has been an explosion of interest in the properties of this novel macroscopic quantum system the book covers the methods used to produce these new samples of coherent atoms their manipulation and the study of their properties emphasis is given to the anticipated development of new types of sources which more and more resemble traditional types of lasers because of recent new applications and increasing demand for lasers sensors and associated instrumentation the

chapters also cover current developments in the basic techniques materials and applications in the field of the generation of coherent atoms

Poincare Seminar 2003 2004-05-25 this volume gives an up to date systematic account of the microscopic theory of bose condensed fluids developed since the late 1950s in contrast to the usual phenomenological discussions of superfluid ^4He the present treatment is built on the pivotal role of the bose broken symmetry and a bose condensate the many body formalism is developed with emphasis on the one and two particle green s functions and their relation to the density response function these are all coupled together by the bose broken symmetry which provides the basis for understanding the elementary excitations and response functions in the hydrodynamic and collisionless regions it also explains the difference between excitations in the superfluid and normal phases chapter 4 gives the first critical assessment of the experimental evidence for a bose condensate in liquid ^4He based on high momentum neutron scattering data

Dipole-dipole interaction in a degenerate quantum gas 2007 the first part of this book overviews the physics of lasers and describes some of the more common types of lasers and their applications applications of lasers include cd dvd players laser printers and fiber optic communication devices part ii of this book describes the phenomenon of bose einstein condensation the experimental techniques used to create a bose einstein condensate provide an interesting and unconventional application of lasers that is the cooling and confinement of a dilute gas at very low temperature

Many-Body Schrödinger Dynamics of Bose-Einstein Condensates 2011-08-31 the laser and bose einstein condensation bec in condensed matter physics are the new front line topics which have wide applications in the field of defence optical communications design of new materials in condensed matter precession instrumentation nanotechnology and bioscience this book discusses both topics as they are intimately connected the topics included are laser techniques in the production of ultra cold atoms and bose einstein condensate trapping dynamics of excited antihydrogen atoms laser technology strong laser interaction with matter and use of lasers in nanotechnology

The Mathematics of the Bose Gas and its Condensation 2006-01-17 advancing the experimental study of superfluids relies on increasingly

sophisticated techniques we develop and demonstrate the loading of bose einstein condensates becs into nearly arbitrary trapping potentials with a resolution improved by a factor of seven when compared to reported systems these advanced control techniques have since been adopted by several cold atoms labs around the world how this bec system was used to study 2d superfluid dynamics is described in particular negative temperature vortex states in a two dimensional quantum fluid were observed these states were first predicted by lars onsager 70 years ago and have significance to 2d turbulence in quantum and classical fluids long range interacting systems and defect dynamics in high energy physics these experiments have established dilute gas becs as the prototypical system for the experimental study of point vortices and their nonequilibrium dynamics we also developed a new approach to superfluid circuitry based on classical acoustic circuits demonstrating its conceptual and quantitative superiority over previous lumped element models this has established foundational principles of superfluid circuitry that will impact the design of future transport experiments and new generation quantum devices such as atomtronics circuits and superfluid sensors

Bose-Einstein Condensates and Atom Lasers 2013-03-26 this book is dedicated to professor leonid v keldysh his brilliant contributions to condensed matter physics include the franz keldysh effect an electron hole liquid the nonequilibrium keldysh diagram technique bose einstein condensation of excitons and a metal dielectric transition acoustically induced superlattices multi photon transitions and impact ionization in solids in many respects his work influenced and formed the paradigm of modern condensed matter physics as a result many famous researchers in the field have enthusiastically provided unique contributions to the book

Excitations in a Bose-condensed Liquid 1993-08-19 the discovery of bose einstein condensation bec in trapped ultracold atomic gases in 1995 has led to an explosion of theoretical and experimental research on the properties of bose condensed dilute gases the first treatment of bec at finite temperatures this book presents a thorough account of the theory of two component dynamics and nonequilibrium behaviour in superfluid bose gases it uses a simplified microscopic model to give a clear explicit account of collective modes in both the collisionless and collision dominated regions major topics such as kinetic equations local

equilibrium and two fluid hydrodynamics are introduced at an elementary level explicit predictions are worked out and linked to experiments providing a platform for future experimental and theoretical studies on the finite temperature dynamics of trapped bose gases this book is ideal for researchers and graduate students in ultracold atom physics atomic molecular and optical physics and condensed matter physics

Bose-Einstein Condensation 1996 the first part of this book overviews the physics of lasers and describes some of the more common types of lasers and their applications applications of lasers include cd dvd players laser printers and fiber optic communication devices part ii of this book describes the phenomenon of bose einstein condensation the experimental techniques used to create a bose einstein condensate provide an interesting and unconventional application of lasers that is the cooling and confinement of a dilute gas at very low temperature

Lasers and Their Application to the Observation of Bose-Einstein Condensates 2019-09-04 the study of quantum fluids stimulated by the discovery of superfluidity in liquid helium has experienced renewed interest after the observation of bose einstein condensation bec in ultra cold atomic gases and the observation a new type of quantum fluid with specific characteristics derived from its intrinsic out of equilibrium nature the main objective of this book is to take a snapshot of the state of the art of this fast moving field with a special emphasis on the hot topics and new trends bringing together the most active specialists of the two areas atomic and polaritonic quantum fluids we expect that this book will facilitate the exchange and the collaboration between these two communities working on subjects with very strong analogies

Laser and Bose-Einstein Condensation Physics 2010 covers the state of the art in superfluidity and superconductivity superfluid states of matter addresses the phenomenon of superfluidity superconductivity through an emergent topologically protected constant of motion and covers topics developed over the past 20 years the approach is based on the idea of separating universal classical field superfluid properties of matter from the underlying system s quanta the text begins by deriving the general physical principles behind superfluidity superconductivity within the classical field framework and provides a deep understanding of all key aspects in terms of the dynamics and statistics of a classical field system it proceeds by explaining how this framework emerges in realistic quantum systems with examples that include liquid helium high

temperature superconductors ultra cold atomic bosons and fermions and nuclear matter the book also offers several powerful modern approaches to the subject such as functional and path integrals comprised of 15 chapters this text establishes the fundamental macroscopic properties of superfluids and superconductors within the paradigm of the classical matter field deals with a single component neutral matter field considers fundamentals and properties of superconductors describes new physics of superfluidity and superconductivity that arises in multicomponent systems presents the quantum field perspective on the conditions under which classical field description is relevant in bosonic and fermionic systems introduces the path integral formalism shows how feynman path integrals can be efficiently simulated with the worm algorithm explains why nonsuperfluid insulating ground states of regular and disordered bosons occur under appropriate conditions explores superfluid solids supersolids discusses the rich dynamics of vortices and various aspects of superfluid turbulence at $T=0$ provides account of bcs theory for the weakly interacting fermi gas highlights and analyzes the most crucial developments that has led to the current understanding of superfluidity and superconductivity reviews the variety of superfluid and superconducting systems available today in nature and the laboratory as well as the states that experimental realization is currently actively pursuing

Transport and Turbulence in Quasi-Uniform and Versatile Bose-Einstein Condensates 2020-09-26 the main aim of the work was initially to study the possible relevance of the cross over from bcs superconductivity to bose einstein condensation to explain some unifying features found in experiments on high temperature superconductors during our work we have gradually recognized that many of the technical and physical difficulties that we had to face were present already in the purely bose system we passed then to study more closely the bose system itself the second part of the thesis is dedicated to renormalization group approach for the zero temperature interacting bosons in this way we have healed the divergences of the theory and found the exact infrared behavior of the bose system

Problems of Condensed Matter Physics 2007-12-13 this book offers an overview of polariton bose einstein condensation and the emerging field of polaritonics providing insights into the necessary theoretical basics technological aspects and experimental studies in this fascinating

field of science following a summary of theoretical considerations it guides readers through the rich physics of polariton systems shedding light on the concept of the polariton laser polariton microcavities and the technical realization of optoelectronic devices with polaritonic emissions before discussing the role of external fields used for the manipulation and control of exciton polaritons a glossary provides simplified summaries of the most frequently discussed topics allowing readers to quickly familiarize themselves with the content the book pursues an uncomplicated and intuitive approach to the topics covered while also providing a brief outlook on current and future work its straightforward content will make it accessible to a broad readership ranging from research fellows lecturers and students to interested science and engineering professionals in the interdisciplinary domains of nanotechnology photonics materials sciences and quantum physics

Bose-Condensed Gases at Finite Temperatures 2009-02-19 an original book with a comprehensive collection of significant topics at the frontier of modeling and simulation for bose einstein condensation quantum turbulence and quantum chemistry contributions from leading researchers in the field that touch upon different aspects of physical problems mathematical models numerical methods asymptotic and variational results materials are based on tutorials which are accessible to students and young researchers extensive reference lists lead to both historical developments and recent advances in the fields

Lasers and Their Application to the Observation of Bose-Einstein Condensates 2019

Physics of Quantum Fluids 2013-07-11

Superfluid States of Matter 2015-04-15

Experiments on Bose-Einstein Condensation 2000

Bose-Einstein condensation and quantized flow of microcavity polaritons with long lifetime 2015

Evolution from BCS super-conductivity to Bose-Einstein condensation and infrared behavior of the bosonic limit 1998-10-01

Polariton Physics 2020-03-05

Models and Methods for Quantum Condensation and Fluids 2022-12

OSA Trends in Optics and Photonics on Ultracold Atoms and Bose-Einstein-condensation 1996-01-01

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