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KEY=NUMBER - LIZETH SMITH

FRONTIERS IN NUMBER THEORY, PHYSICS, AND GEOMETRY II

ON CONFORMAL FIELD THEORIES, DISCRETE GROUPS AND RENORMALIZATION

Springer Science & Business Media *Ten years after a 1989 meeting of number theorists and physicists at the Centre de Physique des Houches, a second event focused on the broader interface of number theory, geometry, and physics. This book is the first of two volumes resulting from that meeting. Broken into three parts, it covers Conformal Field Theories, Discrete Groups, and Renormalization, offering extended versions of the lecture courses and shorter texts on special topics.*

WHAT IS A QUANTUM FIELD THEORY?

Cambridge University Press *A lively and erudite introduction for readers with a background in undergraduate mathematics but no previous knowledge of physics.*

NONCOMMUTATIVE GEOMETRY AND PHYSICS

RENORMALISATION, MOTIVES, INDEX THEORY

European Mathematical Society *This collection of expository articles grew out of the workshop ``Number Theory and Physics'' held in March 2009 at The Erwin Schrodinger International Institute for Mathematical Physics, Vienna. The common theme of the articles is the influence of ideas from noncommutative geometry (NCG) on subjects ranging from number theory to Lie algebras, index theory, and mathematical physics. Matilde Marcolli's article gives a survey of relevant aspects of NCG in number theory, building on an introduction to motives for beginners by Jorge Plazas and Sujatha Ramdorai. A mildly unconventional view of index theory, from the viewpoint of NCG, is described in the article by Alan Carey, John Phillips, and Adam Rennie. As developed by Alain Connes and Dirk Kreimer, NCG also provides insight into novel algebraic structures underlying many analytic aspects of quantum field theory. Dominique Manchon's article on pre-Lie algebras fits into this developing research area. This interplay of algebraic and analytic techniques also appears in the articles by Christoph Bergbauer, who introduces renormalization theory and Feynman diagram methods, and Sylvie Paycha, who focuses on relations between renormalization and zeta function techniques.*

METRIC AND DIFFERENTIAL GEOMETRY

THE JEFF CHEEGER ANNIVERSARY VOLUME

Springer Science & Business Media *Metric and Differential Geometry grew out of a similarly named conference held at Chern Institute of Mathematics, Tianjin and Capital Normal University, Beijing. The various contributions to this volume cover a broad range of topics in metric and differential geometry, including metric spaces, Ricci flow, Einstein manifolds, Kähler geometry, index theory, hypoelliptic Laplacian and analytic torsion. It offers the most recent advances as well as surveys the new developments. Contributors: M.T. Anderson J.-M. Bismut X. Chen X. Dai R. Harvey P. Koskela B. Lawson X. Ma R. Melrose W. Müller A. Naor J. Simons C. Sormani D. Sullivan S. Sun G. Tian K. Wildrick W. Zhang*

REPRESENTATIONS OF LINEAR GROUPS

AN INTRODUCTION BASED ON EXAMPLES FROM PHYSICS AND NUMBER THEORY

Springer Science & Business Media *This is an elementary introduction to the representation theory of real and complex matrix groups. The text is written for students in mathematics and physics who have a good knowledge of differential/integral calculus and linear algebra and are familiar with basic facts from algebra, number theory and complex analysis. The goal is to present the fundamental concepts of representation theory, to describe the connection between them, and to explain some of their background. The focus is on groups which are of particular interest for applications in physics and number theory (e.g. Gell-Mann's eightfold way and theta functions, automorphic forms). The reader finds a large variety of examples which are presented in detail and from different*

points of view.

NBS MONOGRAPH

TOPOLOGY, GEOMETRY AND QUANTUM FIELD THEORY

PROCEEDINGS OF THE 2002 OXFORD SYMPOSIUM IN HONOUR OF THE 60TH BIRTHDAY OF GRAEME SEGAL

Cambridge University Press *Visionary articles explaining approaches to important problems on the interface of pure mathematics and mathematical physics.*

NONLINEAR, NONLOCAL AND FRACTIONAL TURBULENCE

ALTERNATIVE RECIPES FOR THE MODELING OF TURBULENCE

Springer Nature *Experts of fluid dynamics agree that turbulence is nonlinear and nonlocal. Because of a direct correspondence, nonlocality also implies fractionality. Fractional dynamics is the physics related to fractal (geometrical) systems and is described by fractional calculus. Up-to-present, numerous criticisms of linear and local theories of turbulence have been published. Nonlinearity has established itself quite well, but so far only a very small number of general nonlocal concepts and no concrete nonlocal turbulent flow solutions were available. This book presents the first analytical and numerical solutions of elementary turbulent flow problems, mainly based on a nonlocal closure. Considerations involve anomalous diffusion (Lévy flights), fractal geometry (fractal-β, bi-fractal and multi-fractal model) and fractional dynamics. Examples include a new 'law of the wall' and a generalization of Kraichnan's energy-enstrophy spectrum that is in harmony with non-extensive and non-equilibrium thermodynamics (Tsallis thermodynamics) and experiments. Furthermore, the presented theories of turbulence reveal critical and cooperative phenomena in analogy with phase transitions in other physical systems, e.g., binary fluids, para-ferromagnetic materials, etc.; the two phases of turbulence identifying the laminar streaks and coherent vorticity-rich structures. This book is intended, apart from fluids specialists, for researchers in physics, as well as applied and numerical mathematics, who would like to acquire knowledge about alternative approaches involved in the analytical and numerical treatment of turbulence.*

AN INVITATION TO NONCOMMUTATIVE GEOMETRY

World Scientific *This is the first existing volume that collects lectures on this important and fast developing subject in mathematics. The lectures are given by leading experts in the field and the range of topics is kept as broad as possible by including both the algebraic and the differential aspects of noncommutative geometry as well as recent applications to theoretical physics and number theory.*

MATHEMATICAL PHYSICS: CLASSICAL MECHANICS

Springer *As a limit theory of quantum mechanics, classical dynamics comprises a large variety of phenomena, from computable (integrable) to chaotic (mixing) behavior. This book presents the KAM (Kolmogorov-Arnold-Moser) theory and asymptotic completeness in classical scattering. Including a wealth of fascinating examples in physics, it offers not only an excellent selection of basic topics, but also an introduction to a number of current areas of research in the field of classical mechanics. Thanks to the didactic structure and concise appendices, the presentation is self-contained and requires only knowledge of the basic courses in mathematics. The book addresses the needs of graduate and senior undergraduate students in mathematics and physics, and of researchers interested in approaching classical mechanics from a modern point of view.*

TOWARDS THE MATHEMATICS OF QUANTUM FIELD THEORY

Springer Science & Business Media *This ambitious and original book sets out to introduce to mathematicians (even including graduate students) the mathematical methods of theoretical and experimental quantum field theory, with an emphasis on coordinate-free presentations of the mathematical objects in use. This in turn promotes the interaction between mathematicians and physicists by supplying a common and flexible language for the good of both communities, though mathematicians are the primary target. This reference work provides a coherent and complete mathematical toolbox for classical and quantum field theory, based on categorical and homotopical methods, representing an original contribution to the literature. The first part of the book introduces the mathematical methods needed to work with the physicists' spaces of fields, including parameterized and functional differential geometry, functorial analysis, and the homotopical geometric theory of non-linear partial differential equations, with applications to general gauge theories. The second part presents a large family of examples of classical field theories, both from experimental and theoretical physics, while the third part provides an introduction to quantum field theory, presents various renormalization methods, and discusses the quantization of factorization algebras.*

CLIFFORD ALGEBRAS AND THEIR APPLICATIONS IN MATHEMATICAL PHYSICS

VOLUME 1: ALGEBRA AND PHYSICS

Springer Science & Business Media *The plausible relativistic physical variables describing a spinning, charged and massive particle are, besides the charge itself, its Minkowski (four) po sition X, its relativistic linear (four) momentum P and also its so-called Lorentz (four) angular momentum E # 0, the latter forming four trans lation invariant part of its total angular (four) momentum M. Expressing these variables in terms of Poincare covariant real valued functions defined on an extended relativistic phase space [2, 7J means that the mutual Pois son bracket relations among the total angular momentum functions Mab and the linear momentum functions pa have to represent the commutation relations of the Poincare algebra. On any such an extended relativistic phase space, as shown by Zakrzewski [2, 7], the (natural?) Poisson bracket relations (1. 1) imply that for the splitting of the total angular*

momentum into its orbital and its spin part (1. 2) one necessarily obtains (1. 3) On the other hand it is always possible to shift (translate) the commuting (see (1. 1)) four position xa by a four vector ~Xa (1. 4) so that the total angular four momentum splits instead into a new orbital and a new (Pauli-Lubanski) spin part (1. 5) in such a way that (1. 6) However, as proved by Zakrzewski [2, 7J, the so-defined new shifted four a position functions X must fulfill the following Poisson bracket relations: (1.

GRAPHS AND PATTERNS IN MATHEMATICS AND THEORETICAL PHYSICS

PROCEEDINGS OF THE CONFERENCE ON GRAPHS AND PATTERNS IN MATHEMATICS AND THEORETICAL PHYSICS, DEDICATED TO DENNIS SULLIVAN'S 60TH BIRTHDAY, JUNE 14-21, 2001, STONY BROOK UNIVERSITY, STONY BROOK, NY

American Mathematical Soc. *The Stony Brook Conference, 'Graphs and Patterns in Mathematics and Theoretical Physics', was dedicated to Dennis Sullivan in honor of his sixtieth birthday. The event's scientific content, which was suggested by Sullivan, was largely based on mini-courses and survey lectures. The main idea was to help researchers and graduate students in mathematics and theoretical physics who encounter graphs in their research to overcome conceptual barriers. The collection begins with Sullivan's paper, 'Sigma models and string topology', which describes a background algebraic structure for the sigma model based on algebraic topology and transversality. Other contributions to the volume were organized into five sections: Feynman Diagrams, Algebraic Structures, Manifolds: Invariants and Mirror Symmetry, Combinatorial Aspects of Dynamics, and Physics.These sections, along with more research-oriented articles, contain the following surveys: 'Feynman diagrams for pedestrians and mathematicians' by M. Polyak, 'Notes on universal algebra' by A. Voronov, 'Unimodal maps and hierarchical models' by M. Yampolsky, and 'Quantum geometry in action: big bang and black holes' by A. Ashtekar. This comprehensive volume is suitable for graduate students and research mathematicians interested in graph theory and its applications in mathematics and physics.*

MAX VON LAUE

INTREPID AND TRUE: A BIOGRAPHY OF THE PHYSICS NOBEL LAUREATE

Springer Nature

THE GEOMETRY, TOPOLOGY AND PHYSICS OF MODULI SPACES OF HIGGS BUNDLES

World Scientific *In the 25 years since their introduction, Higgs bundles have seen a surprising number of interactions within different areas of mathematics and physics. There is a recent surge of interest following Ngô Bau Châu's proof of the Fundamental Lemma and the work of Kapustin and Witten on the Geometric Langlands program. The program on The Geometry, Topology and Physics of Moduli Spaces of Higgs Bundles, was held at the Institute for Mathematical Sciences at the National University of Singapore during 2014. It hosted a number of lectures on recent topics of importance related to Higgs bundles, and it is the purpose of this volume to collect these lectures in a form accessible to graduate students and young researchers interested in learning more about this field.*

SUBJECT GUIDE TO BOOKS IN PRINT

CHERN-SIMONS GAUGE THEORY: 20 YEARS AFTER

20 YEARS AFTER

American Mathematical Soc. *In 1989, Edward Witten discovered a deep relationship between quantum field theory and knot theory, and this beautiful discovery created a new field of research called Chern-Simons theory. This field has the remarkable feature of intertwining a large number of diverse branches of research in mathematics and physics, among them low-dimensional topology, differential geometry, quantum algebra, functional and stochastic analysis, quantum gravity, and string theory. The 20-year anniversary of Witten's discovery provided an opportunity to bring together researchers working in Chern-Simons theory for a meeting, and the resulting conference, which took place during the summer of 2009 at the Max Planck Institute for Mathematics in Bonn, included many of the leading experts in the field. This volume documents the activities of the conference and presents several original research articles, including another monumental paper by Witten that is sure to stimulate further activity in this and related fields. This collection will provide an excellent overview of the current research directions and recent progress in Chern-Simons gauge theory.*

STATISTICAL PHYSICS OF NON EQUILIBRIUM QUANTUM PHENOMENA

Springer Nature *This book provides an introduction to topics in non-equilibrium quantum statistical physics for both mathematicians and theoretical physicists. The first part introduces a kinetic equation, of Kolmogorov type, which is needed to describe an isolated atom (actually, in experiments, an ion) under the effect of a classical pumping electromagnetic field which keeps the atom in its excited state(s) together with the random emission of fluorescence photons which put it back into its ground state. The quantum kinetic theory developed in the second part is an extension of Boltzmann's classical (non-quantum) kinetic theory of a dilute gas of quantum bosons. This is the source of many interesting fundamental questions, particularly because, if the temperature is low enough, such a gas is known to have at equilibrium a transition, the Bose–Einstein transition, where a finite portion of the particles stay in the quantum ground state. An important question considered is how a Bose gas condensate develops in time if its energy is initially low enough.*

STOCHASTIC ANALYSIS IN MATHEMATICAL PHYSICS

PROCEEDINGS OF A SATELLITE CONFERENCE OF ICM 2006, LISBON, PORTUGAL, 4-8 SEPTEMBER 2006

World Scientific *The ideas and principles of stochastic analysis have managed to penetrate into various fields of pure and applied mathematics in the last 15 years; it is particularly true for mathematical physics. This volume provides a wide range of applications of stochastic analysis in fields as varied as statistical mechanics, hydrodynamics, Yang-Mills theory and spin-glass theory.The proper concept of stochastic dynamics relevant to each type of application is described in detail here. Altogether, these approaches illustrate the reasons why their dissemination in other fields is likely to accelerate in the years to come.*

INTEGRABLE SYSTEMS, TOPOLOGY, AND PHYSICS

A CONFERENCE ON INTEGRABLE SYSTEMS IN DIFFERENTIAL GEOMETRY, UNIVERSITY OF TOKYO, JAPAN, JULY 17-21, 2000

American Mathematical Soc. *Ideas and techniques from the theory of integrable systems are playing an increasingly important role in geometry. Thanks to the development of tools from Lie theory, algebraic geometry, symplectic geometry, and topology, classical problems are investigated more systematically. New problems are also arising in mathematical physics. A major international conference was held at the University of Tokyo in July 2000. It brought together scientists in all of the areas influenced by integrable systems. This book is the second of three collections of expository and research articles. This volume focuses on topology and physics. The role of zero curvature equations outside of the traditional context of differential geometry has been recognized relatively recently, but it has been an extraordinarily productive one, and most of the articles in this volume make some reference to it.Symplectic geometry, Floer homology, twistor theory, quantum cohomology, and the structure of special equations of mathematical physics, such as the Toda field equations - all of these areas have gained from the integrable systems point of view and contributed to it. Many of the articles in this volume are written by prominent researchers and will serve as introductions to the topics. It is intended for graduate students and researchers interested in integrable systems and their relations to differential geometry, topology, algebraic geometry, and physics. The first volume from this conference, also available from the 'AMS', is ""Differential Geometry and Integrable Systems, Volume 308"" in the ""Contemporary Mathematics"" series. The forthcoming third volume will be published by the Mathematical Society of Japan and will be available outside of Japan from the 'AMS' in the ""Advanced Studies in Pure Mathematics"" series.*

STOCHASTIC ANALYSIS IN MATHEMATICAL PHYSICS

PHENOMENOLOGY OF PARTICLE PHYSICS

Cambridge University Press *Addresses the theoretical and experimental phenomenology of particle physics for two-semester Masters and graduate courses.*

NONCOMMUTATIVE GEOMETRY AND THE STANDARD MODEL OF ELEMENTARY PARTICLE PHYSICS

Springer *The outcome of a close collaboration between mathematicians and mathematical physicists, these lecture notes present the foundations of A. Connes noncommutative geometry as well as its applications in particular to the field of theoretical particle physics. The coherent and systematic approach makes this book useful for experienced researchers and postgraduate students alike.*

THE SCOPE AND HISTORY OF COMMUTATIVE AND NONCOMMUTATIVE HARMONIC ANALYSIS

American Mathematical Soc. *''When I was invited to speak at the conference on the history of analysis given at Rice University [in 1977], I decided that it might be interesting to review the history of mathematics and physics in the last three hundred years or so with heavy emphasis on those parts in which harmonic analysis had played a decisive or at least a major role. I was pleased and somewhat astonished to find how much of both subjects could be included under this rubric ... The picture that gradually emerged as the various details fell into place was one that I found very beautiful, and the process of seeing it do so left me in an almost constant state of euphoria. I would like to believe that others can be led to see this picture by reading my paper, and to facilitate this I have included a large number of short expositions of topics which are not widely understood by non-specialists.'' --from the Preface This volume, containing the paper mentioned above as well as five other reprinted papers by Mackey, presents a sweeping view of the importance, utility, and beauty of harmonic analysis and its connections to other areas of mathematics and science. A seventh paper, written exclusively for this volume, attempts to unify certain themes that emerged after major discoveries in 1967 and 1968 in the areas of Lie algebras, strong interaction physics, statistical mechanics, and nonlinear partial differential equations--discoveries that may at first glance appear to be independent, but which are in fact deeply interrelated. Information for our distributors: Copublished with the London Mathematical Society beginning with volume 4. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.*

LIE METHODS IN DEFORMATION THEORY

Springer Nature *This book furnishes a comprehensive treatment of differential graded Lie algebras, L-infinity algebras, and their use in deformation theory. We believe it is the first textbook devoted to this subject, although the first chapters are also covered in other sources with a different perspective. Deformation theory is an important subject in algebra and algebraic geometry, with an origin that dates back to Kodaira, Spencer, Kuranishi, Gerstenhaber, and Grothendieck. In the last 30 years, a new approach, based on ideas from rational homotopy theory, has made it possible not only to solve long-standing open problems, but also to clarify the general theory and to relate apparently different features. This approach works over a field of characteristic 0, and the central role is played by the notions of differential graded Lie algebra, L-infinity algebra, and Maurer–Cartan equations. The book is written keeping in mind graduate students with a basic knowledge of homological algebra and complex algebraic geometry as utilized, for instance, in the*

book by K. Kodaira, Complex Manifolds and Deformation of Complex Structures. Although the main applications in this book concern deformation theory of complex manifolds, vector bundles, and holomorphic maps, the underlying algebraic theory also applies to a wider class of deformation problems, and it is a prerequisite for anyone interested in derived deformation theory. Researchers in algebra, algebraic geometry, algebraic topology, deformation theory, and noncommutative geometry are the major targets for the book.

A MATHEMATICAL INTRODUCTION TO CONFORMAL FIELD THEORY

Springer *The first part of this book gives a self-contained and mathematically rigorous exposition of classical conformal symmetry in n dimensions and its quantization in two dimensions. The second part surveys some more advanced topics of conformal field theory.*

TOPICS IN MATHEMATICAL PHYSICS, GENERAL RELATIVITY AND COSMOLOGY IN HONOR OF JERZY PLEBANSKI

KERNE, HADRONEN UND ELEMENTARTEILCHEN

EINE KURZE EINFÜHRUNG

Springer-Verlag *Phänomene unterschiedlicher typischer Zeit- oder Längenskalen unterliegen meist unterschiedlichen Gesetzmäßigkeiten. In diese für die jeweilige Skala einzuführen, ist das Ziel dieses Buches. Es beginnt mit wichtigen Fakten und Modellvorstellungen über die Struktur, über den Zerfall und über Streuprozesse von Kernen. Es folgt die "Zoologie" der Hadronen und der Grundtatsachen hadronischer Streuprozesse. Der dritte Teil des Buches gibt eine Kurzeinführung in die Quantenelektrodynamik und die Quantenchromodynamik. Der Strom-Strom-Ansatz der schwachen Wechselwirkung und die Glashow-Weinberg-Salam-Theorie werden im vierten Teil erläutert. Die Higgs-Physik, die erklärt, wie die Massen der Vektorbosonen und (höchstwahrscheinlich) der Fermionen zustande kommen, bildet den Abschluss des Buches. Mit vielen Abbildungen und Beschreibungen versucht das Buch, auch einen Eindruck in die experimentellen Aspekte der jeweiligen Physik zu geben.*

QUARTERLY CHECK-LIST OF PHYSICS, INCLUDING ASTRONOMY AND ASTROPHYSICS

SOLID-STATE PHYSICS

AN INTRODUCTION TO PRINCIPLES OF MATERIALS SCIENCE

Springer Science & Business Media *This new edition of the well-received introduction to solid-state physics provides a comprehensive overview of the basic theoretical and experimental concepts of materials science. Experimental aspects and laboratory details are highlighted in separate panels that enrich text and emphasize recent developments. Notably, new material in the third edition includes sections on important new devices, aspects of non- periodic structures of matter, phase transitions, defects, superconductors and nanostructures. Students will benefit significantly from solving the exercises given at the end of each chapter. This book is intended for university students in physics, materials science and electrical engineering. It has been thoroughly updated to maintain its relevance and usefulness to students and professionals.*

100 YEARS OF GRAVITY AND ACCELERATED FRAMES

THE DEEPEST INSIGHTS OF EINSTEIN AND YANG-MILLS

World Scientific *This collection of papers presents ideas and problems arising over the past 100 years regarding classical and quantum gravity, gauge theories of gravity, and spacetime transformations of accelerated frames. Both Einstein''s theory of gravity and the YangOCoMills theory are gauge invariant. The invariance principles in physics have transcended both kinetic and dynamic properties and are at the very heart of our understanding of the physical world. In this spirit, this book attempts to survey the development of various formulations for gravitational and YangOCoMills fields and spacetime transformations of accelerated frames, and to reveal their associated problems and limitations. The aim is to present some of the leading ideas and problems discussed by physicists and mathematicians. We highlight three aspects: formulations of gravity as a YangOCoMills field, first discussed by Utiyama; problems of gravitational theory, discussed by Feynman, Dyson and others; spacetime properties and the physics of fields and particles in accelerated frames of reference. These unfulfilled aspects of Einstein and YangOCoMills'' profound thoughts present a great challenge to physicists and mathematicians in the 21st century."*

QUANTUM FIELD THEORY II: QUANTUM ELECTRODYNAMICS

A BRIDGE BETWEEN MATHEMATICIANS AND PHYSICISTS

Springer Science & Business Media *And God said, Let there be light; and there was light. Genesis 1,3 Light is not only the basis of our biological existence, but also an essential source of our knowledge about the physical laws of nature, ranging from the seventeenth century geometrical optics up to the twentieth century theory of general relativity and quantum electrodynamics. Folklore Don’t give us numbers: give us insight! A contemporary natural scientist to a mathematician The present book is the second volume of a comprehensive introduction to themathematicalandphysicalaspectsofmodernquantum?eldtheorywhich comprehends the following six volumes: Volume I: Basics in Mathematics and Physics Volume II: Quantum Electrodynamics Volume III: Gauge Theory Volume IV: Quantum Mathematics Volume V: The Physics of the Standard Model Volume VI: Quantum Gravitation and String Theory. It is our goal to build a bridge between mathematicians and physicists based on the challenging question about the fundamental forces in • macrocosmos (the universe) and • microcosmos (the world of elementary particles). The six volumes address a broad audience of readers, including both und- graduate and graduate students, as well as experienced scientists who want to become familiar with quantum ?eld theory, which is a fascinating topic in modern mathematics and physics.*

SPECIAL FUNCTIONS

A UNIFIED THEORY BASED ON SINGULARITIES

Oxford University Press on Demand *The subject of this book is the theory of special functions, not considered as a list of functions exhibiting a certain range of properties, but based on the unified study of singularities of second-order ordinary differential equations in the complex domain. The number and characteristics of the singularities serve as a basis for classification of each individual special function. Links between linear special functions (as solutions of linear second-order equations), and non-linear special functions (as solutions of Painlevé equations) are presented as a basic and new result. Many applications to different areas of physics are shown and discussed. The book is written from a practical point of view and will address all those scientists whose work involves applications of mathematical methods. Lecturers, graduate students and researchers will find this a useful text and reference work.*

DICTIONARY CATALOG OF THE RESEARCH LIBRARIES OF THE NEW YORK PUBLIC LIBRARY, 1911-1971

THE FUNDAMENTALS OF DENSITY FUNCTIONAL THEORY

Vieweg+Teubner Verlag *Density functional methods form the basis of a diversified and very active area of present days computational atomic, molecular, solid state and even nuclear physics. A large number of computational physicists use these meth ods merely as a recipe, not reflecting too much upon their logical basis. One also observes, despite of their tremendeous success, a certain reservation in their acceptance on the part of the more theoretically oriented researchers in the above mentioned fields. On the other hand, in the seventies (Thomas Fermi theory) and in the eighties (Hohenberg-Kohn theory), density func tional concepts became subjects of mathematical physics. In 1994 a number of activities took place to celebrate the thirtieth an niversary of Hohenberg-Kohn-Sham theory. I took this an occassion to give lectures on density functional theory to senior students and postgraduates in the winter term of 1994, particularly focusing on the logical basis of the the ory. Preparing these lectures, the impression grew that, although there is a wealth of monographs and reviews in the literature devoted to density func tional theory, the focus is nearly always placed upon extending the practical applications of the theory and on the development of improved approxima tions. The logical foundadion of the theory is found somewhat scattered in the existing literature, and is not always satisfactorily presented. This situation led to the idea to prepare a printed version of the lecture notes, which resulted in the present text.*

AN INTRODUCTION TO IDENTIFICATION PROBLEMS VIA FUNCTIONAL ANALYSIS

Walter de Gruyter GmbH & Co KG *this monographis based on two courses in computational mathematics and operative research, which were given by the author in recent years to doctorate and PhD students. The text focuses on an aspect of the theory of inverse problems, which is usually referred to as identification of parameters (numbers, vectors, matrices, functions) appearing in differential– or integrodifferential– equations. The parameters of such equations are either quite unknown or partially unknown, however knowledge about these is usually essential as they describe the intrinsic properties of the material or substance under consideration.*

THE FUNDAMENTALS OF DENSITY FUNCTIONAL THEORY

Springer Science & Business Media *Density functional methods form the basis of a diversified and very active area of present days computational atomic, molecular, solid state and even nuclear physics. A large number of computational physicists use these meth ods merely as a recipe, not reflecting too much upon their logical basis. One also observes, despite of their tremendeous success, a certain reservation in their acceptance on the part of the more theoretically oriented researchers in the above mentioned fields. On the other hand, in the seventies (Thomas Fermi theory) and in the eighties (Hohenberg-Kohn theory), density func tional concepts became subjects of mathematical physics. In 1994 a number of activities took place to celebrate the thirtieth an niversary of Hohenberg-Kohn-Sham theory. I took this an occassion to give lectures on density functional theory to senior students and postgraduates in the winter term of 1994, particularly focusing on the logical basis of the the ory. Preparing these lectures, the impression grew that, although there is a wealth of monographs and reviews in the literature devoted to density func tional theory, the focus is nearly always placed upon extending the practical applications of the theory and on the development of improved approxima tions. The logical foundadion of the theory is found somewhat scattered in the existing literature, and is not always satisfactorily presented. This situation led to the idea to prepare a printed version of the lecture notes, which resulted in the present text.*

ACS MONOGRAPH

BEITRÄGE ZUR PHYSIK DER ATMOSPHÄRE

MATHEMATICAL PHYSICS IN ONE DIMENSION

EXACTLY SOLUBLE MODELS OF INTERACTING PARTICLES

Academic Press *Mathematical Physics in One Dimension: Exactly Soluble Models of Interacting Particles covers problems of mathematical physics with one-dimensional analogs. The book discusses classical statistical mechanics and phase transitions; the disordered chain of harmonic oscillators; and electron energy bands in ordered and disordered crystals. The text also describes the many-fermion problem; the theory of the interacting boson gas; the theory of the antiferromagnetic linear chains; and the time-dependent phenomena of many-body systems (i.e., classical or quantum-mechanical dynamics). Physicists and mathematicians will find the book invaluable.*