

## Quantum Communications In Space Qspace Executive

Gauge field theories underlie all models now used in elementary particle physics. These theories refer to the class of singular theories which are also theories with constraints. The quantization of singular theories remains one of the key problems of quantum field theory and is being intensively discussed in the literature. This book is an attempt to fill the need for a comprehensive analysis of this problem, which has not heretofore been met by the available monographs and reviews. The main topics are canonical quantization and the path integral method. In addition, the Lagrangian BRST quantization is completely described, for the first time in a monograph. The book also presents a number of original results obtained by the authors, in particular, a complete description of the physical sector of an arbitrary gauge theory, quantization of singular theories with higher theories with time-dependent constraints, and correct derivatives, quantization of canonical quantization of theories of a relativistic point-like particle. As a general illustration we present quantization of field theories such as electrodynamics, Yang-Mills theory, and gravity. It should be noted that this monograph is aimed not only at giving the reader the rules of quantization according to the principle "if you do it this way, it will be good", but also at presenting strong arguments based on the modern interpretation of the classical and quantum theories which show that these methods are the natural, if not the only possible ones.

This book demonstrates that a quantum communication system using the coherent light of a laser can achieve performance orders of magnitude superior to classical optical communications. Quantum Communications provides the Masters and PhD signals or communications student with a complete basics-to-applications course in using the principles of quantum mechanics to provide cutting-edge telecommunications. Assuming only knowledge of elementary probability, complex analysis and optics, the book guides its reader through the fundamentals of vector and Hilbert spaces and the necessary quantum-mechanical ideas, simply formulated in four postulates. A turn to practical matters begins with and is then developed by: development of the concept of quantum decision, emphasizing the optimization of measurements to extract useful information from a quantum system; general formulation of a transmitter–receiver system particular treatment of the most popular quantum communications systems—OOK, PPM, PSK and QAM; more realistic performance evaluation introducing thermal noise and system description with density operators; consideration of scarce existing implementations of quantum communications systems and their difficulties with suggestions for future improvement; and separate treatment of quantum information with discrete and continuous states. Quantum Communications develops the engineering student's exposure to quantum mechanics and shows physics students that its theories can have practically beneficial application in communications systems. The use of example and exercise questions (together with a downloadable solutions manual for instructors, available from <http://extras.springer.com/>) will help to make the material presented really sink in for students and invigorate subsequent research.

As our society grows ever more reliant on computers, so it also becomes more vulnerable to computer crime. Cyber attacks have been plaguing computer users since the 1980s, and computer security experts are predicting that smart telephones and other mobile devices will also become the targets of cyber security threats in the future. Developed from the author's successful Springer guide to Foundations of Computer Security, this accessible textbook/reference is fully updated and enhanced with resources for students and tutors. Topics and features: examines the physical security of computer hardware, networks, and digital data; introduces the different forms of rogue software (or malware), discusses methods for preventing and defending against malware, and describes a selection of viruses, worms and Trojans in detail; investigates the important threats to network security, and explores the subjects of authentication, spyware, and identity theft; discusses issues of privacy and trust in the online world, including children's privacy and safety; includes appendices which discuss the definition, meaning, and history of the term hacker, introduce the language of "l33t Speak", and provide a detailed virus timeline; provides numerous exercises and examples throughout the text, in addition to a Glossary of terms used in the book; supplies additional resources at the associated website, <http://www.DavidSalomon.name/>, including an introduction to cryptography, and answers to the exercises. Clearly and engagingly written, this concise textbook is an ideal resource for undergraduate classes on computer security. The book is mostly non-mathematical, and is suitable for anyone familiar with the basic concepts of computers and computations.

This volume contains the proceedings of the Third International Conference on Quantum Communication and Measurement. The series of international conferences on quantum communication and measurement was established to encourage scientists working in the interdisciplinary research fields of quantum communication science and technology. The first such conference, organized by C. Benjaballah and O. Hirota under the title "Quantum Aspects of Optical Communication," assembled approximately 80 researchers in Paris in 1990. The second conference, held in Nottingham in 1994, was organized by V. P. Belavkin, R. L. Hudson, and O. Hirota and attracted about 130 participants from 22 countries. The present conference, organized by O. Hirota, A. S. Holevo, C. M. Caves, H. P. Yuen, and L. Accardi, was held September 25-30, 1996, in Fuji-Hakone Land, Japan, and involved about 120 researchers from 15 countries. The topics at this third conference included the foundations of quantum communication and information theory, quantum measurement theory, quantum cryptography and quantum computation, quantum devices and high-precision measurements, generation of nonclassical light, and atom optics. Special emphasis was placed on bringing together research workers in experimental and engineering fields of quantum communication and quantum computing and theoreticians working in quantum measurement and information theory. Nineteen plenary and parallel sessions and one poster session were organized, at which a total of 82 papers were presented. Interesting and stimulating scientific discussions took place between and after sessions as well as in the evenings.

Contains detailed coverage such as: Modems and cables--types, installation, and use; Commercial and shareware telecommunications software--how to use White Knight, Microphone II, FreeTerm, Red Ryder, and More. Readers learn how to find what they're looking for fast and inexpensively, how to remain a welcome online visitor, how to interpret all the confusing terms, and more.

These notes are based on a course entitled "Symplectic Geometry and Geometric Quantization" taught by Alan Weinstein at the University of California, Berkeley (fall 1992) and at the Centre Emile Borel (spring 1994). The only prerequisite for the course needed is a knowledge of the basic notions from the theory of differentiable manifolds (differential forms, vector fields, transversality, etc.). The aim is to give students an introduction to the ideas of microlocal analysis and the related symplectic geometry, with an emphasis on the role these ideas play in formalizing the transition between the mathematics of classical dynamics (hamiltonian flows on symplectic manifolds) and quantum mechanics (unitary flows on Hilbert spaces). These notes are meant to function as a guide to the literature. The authors refer to other sources for many details that are omitted and can be

bypassed on a first reading.

A vacant patch of South African veld next to the comfortable, complacent Malgas household has been taken over by a mysterious, eccentric figure with "a plan." Fashioning his tools out of recycled garbage, the stranger enlists Malgas's help in clearing the land and planning his mansion. Slowly but inevitably, the stranger's charm and the novel's richly inventive language draws Malgas into "the plan" and he sees, feels and moves into the new building. Then, just as remorselessly, all that seemed solid begins to melt back into air.

Progress in modern radio astronomy led to the discovery of space masers in the microwave range, and it became a powerful tool for studies of interstellar star-forming molecular clouds. Progress in observational astronomy, particularly with ground-based huge telescopes and the space-based Hubble Space Telescope, has led to recent discoveries of space lasers in the optical range. These operate in gas condensations in the vicinity of the mysterious star Eta Carinae (one of the most luminous and massive stars of our Galaxy). Both maser and laser effects, first demonstrated under laboratory conditions, have now been discovered to occur under natural conditions in space too. This book describes consistently the elements of laser science, astrophysical plasmas, modern astronomical observation techniques, and the fundamentals and properties of astrophysical lasers. A book with such an interdisciplinary scope has not been available to date. The book will also be useful for a wider audience interested in modern developments of the natural sciences and technology.

Modern physics rests on two fundamental building blocks: general relativity and quantum theory. General relativity is a geometric interpretation of gravity while quantum theory governs the microscopic behaviour of matter. Since matter is described by quantum theory which in turn couples to geometry, we need a quantum theory of gravity. In order to construct quantum gravity one must reformulate quantum theory on a background independent way. Modern Canonical Quantum General Relativity provides a complete treatise of the canonical quantisation of general relativity. The focus is on detailing the conceptual and mathematical framework, on describing physical applications and on summarising the status of this programme in its most popular incarnation, called loop quantum gravity. Mathematical concepts and their relevance to physics are provided within this book, which therefore can be read by graduate students with basic knowledge of quantum field theory or general relativity.

Essentials of Mineral Exploration and Evaluation offers a thorough overview of methods used in mineral exploration campaigns, evaluation, reporting and economic assessment processes. Fully illustrated to cover the state-of-the-art exploration techniques and evaluation of mineral assets being practiced globally, this up-to-date reference offers balanced coverage of the latest knowledge and current global trends in successful mineral exploration and evaluation. From mineral deposits, to remote sensing, to sampling and analysis, Essentials of Mineral Exploration and Evaluation offers an extensive look at this rapidly changing field. Covers the complete spectrum of all aspects of ore deposits and mining them, providing a "one-stop shop" for experts and students Presents the most up-to-date information on developments and methods in all areas of mineral exploration Includes chapters on application of GIS, statistics, and geostatistics in mineral exploration and evaluation Includes case studies to enhance practical application of concepts Featuring detailed explanations of the major algorithms used in quantum Monte Carlo simulations, this is the first textbook of its kind to provide a pedagogical overview of the field and its applications. The book provides a comprehensive introduction to the Monte Carlo method, its use, and its foundations, and examines algorithms for the simulation of quantum many-body lattice problems at finite and zero temperature. These algorithms include continuous-time loop and cluster algorithms for quantum spins, determinant methods for simulating fermions, power methods for computing ground and excited states, and the variational Monte Carlo method. Also discussed are continuous-time algorithms for quantum impurity models and their use within dynamical mean-field theory, along with algorithms for analytically continuing imaginary-time quantum Monte Carlo data. The parallelization of Monte Carlo simulations is also addressed. This is an essential resource for graduate students, teachers, and researchers interested in quantum Monte Carlo techniques.

The multidisciplinary field of quantum computing strives to exploit some of the uncanny aspects of quantum mechanics to expand our computational horizons. Quantum Computing for Computer Scientists takes readers on a tour of this fascinating area of cutting-edge research. Written in an accessible yet rigorous fashion, this book employs ideas and techniques familiar to every student of computer science. The reader is not expected to have any advanced mathematics or physics background. After presenting the necessary prerequisites, the material is organized to look at different aspects of quantum computing from the specific standpoint of computer science. There are chapters on computer architecture, algorithms, programming languages, theoretical computer science, cryptography, information theory, and hardware. The text has step-by-step examples, more than two hundred exercises with solutions, and programming drills that bring the ideas of quantum computing alive for today's computer science students and researchers.

Leading experts from "The Physics of Quantum Information" network, initiated by the European Commission, bring together the most recent results from this emerging area of quantum technology. Written in a consistent style as a research monograph, the book introduces quantum cryptography, quantum teleportation, and quantum computation, considering both theory and newest experiments. Both scientists working in the field and advanced students will find a rich source of information on this exciting new area.

Since the advent of optical communications, a great technological effort has been devoted to the exploitation of the huge bandwidth of optical fibers. Starting from a few Mb/s single channel systems, a fast and constant technological development has led to the actual 10 Gb/s per channel dense wavelength - vision multiplexing (DWDM) systems, with dozens of channels on a single fiber. Transmitters and receivers are now ready for 40 Gb/s, whereas hundreds of channels can be simultaneously amplified by optical amplifiers. Nevertheless, despite such a pace in technological progress, optical communications are still in a primitive stage if compared, for instance, to radio communications: the widely spread on-off keying (OOK) modulation format is equivalent to the rough amplitude modulation (AM) format,

whereas the DWDM technique is nothing more than the optical version of the frequency - vision multiplexing (FDM) technique. Moreover, adaptive equalization, ch- nel coding or maximum likelihood detection are still considered something "exotic" in the optical world. This is mainly due to the favourable char- teristics of the fiber optic channel (large bandwidth, low attenuation, channel stability, ...), which so far allowed us to use very simple transmission and detection techniques.

In Quantum Anthropologies, the renowned feminist theorist Vicki Kirby contends that some of the most provocative aspects of deconstruction have yet to be explored. Deconstruction's implications have been curtailed by the assumption that issues of textuality and representation are specific to the domain of culture. Revisiting Derrida's claim that there is "no outside of text," Kirby argues that theories of cultural construction developed since the linguistic turn have inadvertently reproduced the very binaries they intended to question, such as those between nature and culture, matter and ideation, and fact and value. Through new readings of Derrida, Husserl, Saussure, Butler, Irigaray, and Merleau-Ponty, Kirby exposes the limitations of theories that regard culture as a second-order system that cannot access—much less be—nature, body, and materiality. She suggests ways of reconceiving language and culture to enable a more materially implicated outcome, one that keeps alive the more counterintuitive and challenging aspects of poststructural criticism. By demonstrating how fields, including cybernetics, biology, forensics, mathematics, and physics, can be conceptualized in deconstructive terms, Kirby fundamentally rethinks deconstruction and its relevance to nature, embodiment, materialism, and science.

This book tells mathematicians about an amazing subject invented by physicists and it tells physicists how a master mathematician must proceed in order to understand it. Physicists who know quantum field theory can learn the powerful methodology of mathematical structure, while mathematicians can position themselves to use the magical ideas of quantum field theory in "mathematics" itself. The retelling of the tale mathematically by Kevin Costello is a beautiful tour de force. --Dennis Sullivan This book is quite a remarkable contribution. It should make perturbative quantum field theory accessible to mathematicians. There is a lot of insight in the way the author uses the renormalization group and effective field theory to analyze perturbative renormalization; this may serve as a springboard to a wider use of those topics, hopefully to an eventual nonperturbative understanding. --Edward Witten Quantum field theory has had a profound influence on mathematics, and on geometry in particular. However, the notorious difficulties of renormalization have made quantum field theory very inaccessible for mathematicians. This book provides complete mathematical foundations for the theory of perturbative quantum field theory, based on Wilson's ideas of low-energy effective field theory and on the Batalin- Vilkovisky formalism. As an example, a cohomological proof of perturbative renormalizability of Yang-Mills theory is presented. An effort has been made to make the book accessible to mathematicians who have had no prior exposure to quantum field theory. Graduate students who have taken classes in basic functional analysis and homological algebra should be able to read this book.

Unified Signal Theory is an indispensable textbook dealing with the theory of deterministic signals; a topic of fundamental interest to graduates and senior undergraduates in the areas of information engineering (telecommunications, control, systems theory and electronics), astronomy, oceanography, earth science, biology and medicine. The unified theory follows an innovative approach – that of combining all signal classes into just one. The fundamental signal operations (convolution, Fourier transform, linear systems, sampling and interpolation) are established simultaneously for all the signal classes. This unified approach avoids the repetition of similar concepts consequent on other approaches' separate treatment of definitions and properties for each signal class. Modern wavelet ideas are developed in harmony with the rest of the text. Unified Signal Theory provides: • exercises and examples, to give the student practice; • solutions which are available for download and save the tutor time; and • a choice of two suggested reading paths depending on the level of the student, for an enhanced learning experience. The advantages of the unified approach are many: it permits a global vision of the topic, it is economical in teaching and learning, and it can be adjusted easily to fit new applications. This textbook presents the theory in five chapters, and goes on to demonstrate specific applications such as fast Fourier transform implementation, sampling and reconstructions of signals, and multicolor modulation systems, in a further six chapters. Mathematical concepts are introduced conceptually within the body of the book with more rigorous treatment being reserved for the appendices.

Relativity Reexamined examines relativity from a new angle and with an unconventional perspective. Topics covered range from quantum theory and relativity to gravitation and relativity quantized atomic clocks, as well as special relativity Doppler effect and spherical symmetry. A distinction is also made between mathematical coordinates and physical frames of reference. This book is comprised of eight chapters and begins by considering the development of scientific theories in general, citing examples to show how scientists' viewpoints have progressively changed. Some of the problems that have emerged, and which even Albert Einstein was unable to foresee, are highlighted. The first chapter reviews the historical sequence of events that led to quantum theory and relativity, while the second chapter focuses on some problems about restricted relativity, paying particular attention to the meaning of potential energy and the importance of field theory in relativistic theories. The following chapters analyze a variety of experimental evidences that challenge many basic assumptions in theoretical physics, focusing on the fundamental importance of the Mössbauer effect and of atomic clocks; the link between gravitation and relativity; classical problems of theoretical mechanics; and special relativity Doppler effect. A gravistatic problem with spherical symmetry is also described. This monograph will be of interest to physicists and students of physics.

In this comprehensive, revised edition, Chen-To Tai gives extensive attention to recent research surrounding the technique of dyadic Green functions, valuable information for anyone involved in electrical engineering. Additional formulations are introduced, including the classifications and the different methods of finding the eigenfunction

expansions. Important new features in this edition include: Maxwell's equations, cast in a dyadic form; the integral solutions of Maxwell's equations; a detailed discussion of complementary reciprocal theorems and transient radiation in moving media, and the derivation of various dyadic Green functions for problems involving plane layered media. This proceedings is based on the interdisciplinary workshop held in Madrid, 5-9 March 2018, dedicated to Alberto Iborra on his 60th birthday. Alberto has great and significantly contributed to many fields of mathematics and physics, always with highly original and innovative ideas. Most of Alberto's scientific activity has been motivated by geometric ideas, concepts and tools that are deeply related to the framework of classical dynamics and quantum mechanics. Let us mention some of the fields of expertise of Alberto Iborra: Geometric Mechanics; Constrained Systems; Variational Principles; Multisymplectic structures for field theories; Super manifolds; Inverse problem for Bosonic and Fermionic systems; Quantum Groups, Integrable systems, BRST Symmetries; Implicit differential equations; Yang-Mills Theories; BiHamiltonian Systems; Topology Change and Quantum Boundary Conditions; Classical and Quantum Control; Orthogonal Polynomials; Quantum Field Theory and Noncommutative Spaces; Classical and Quantum Tomography; Quantum Mechanics on phase space; Wigner-Weyl formalism; Lie-Jordan Algebras, Classical and Quantum; Quantum-to-Classical transition; Contraction of Associative Algebras; contact geometry, among many others. In each contribution, one may find not only technical novelties but also completely new way of looking at the considered problems. Even an experienced reader, reading Alberto's contributions on his field of expertise, will find new perspectives on the considered topic. His enthusiasm is happily contagious, for this reason he has had, and still has, very bright students wishing to elaborate their PhD thesis under his guidance. What is more impressive, is the broad list of rather different topics on which he has contributed.

Contains nearly three hundred articles that provide information about various aspects of the computer sciences, discussing the history of computing, software and hardware, the social applications of computers, and the impact of computers on society. Includes illustrations, time lines, glossaries, and indexes.

Quantum Communications in Space (QSpace) Executive Summary Report : Prepared for the European Space Agency Under ESTEC/Contract No. 16358/02/NL/SFe Bulletin ASE Optical Communication Theory and Techniques Springer Science & Business Media

By combining provocative prose with photo-essay, *Time and the Suburbs* explores the disappearance of cities in North America under the weight of suburban, exurban, and other forms of development that are changing the way we live and do politics. Drawing on social theory from Henri Lefebvre and Guy Debord to Antonio Negri, this book reconceptualizes the tasks facing activists and social movements. This is both a provocative essay and introduction to important social theory for anyone interested in cities and urban development.

This volume contains the proceedings of a highly successful AMS Short Course on Chaos and Fractals, held during the AMS Centennial Celebration in Providence, Rhode Island in August 1988. Chaos and fractals have been the subject of great interest in recent years and have proven to be useful in a variety of areas of mathematics and the sciences. The purpose of the short course was to provide a solid introduction to the mathematics underlying the notions of chaos and fractals. The papers in this book range over such topics as dynamical systems theory, Julia sets, the Mandelbrot set, attractors, the Smale horseshoe, calculus on fractals, and applications to data compression. The authors represented here are some of the top experts in this field. Aimed at beginning graduate students, college and university mathematics instructors, and non-mathematics researchers, this book provides readable expositions of several exciting topics of contemporary research.

Books on bioinformatics which began appearing in the mid 80s primarily served gene-hunters, and biologists who wished to construct family trees showing tidy lines of descent. Given the great pharmaceutical industry interest in genes, this trend has continued in most subsequent texts. These deal extensively with the exciting topic of gene discovery and searching databases, but hardly consider genomes as information channels through which multiple forms and levels of information, including genic information, have passed through the generations.

This is a book about Johannesburg and one man's place in it: a provocative, teasing, revealing, analytical and poetic text on the city and the life rooted in its concrete streets. A high-water mark in Ivan Vladislavić's writing, *Portrait with Keys* is a sprawling yet comprehensive portrait of his Joburg. His gaze roams freely across the decades, but the focus falls on the eve of the millennium. Neither a novel in any conventional sense nor a collection of short stories, this chain of lyrical texts brings together memoir, history, snapshots, meditations, asides on arts and – not least – observations on that essential urban accessory, the Gorilla steering lock. Home, habit, change, memory, mortality, friendship, ghosts, gardens, walking, falling, selling and stealing are all part of this unique dossier of city life. *Portrait with Keys* is an extraordinary work, both an oblique self-portrait of the author and a vivid recovery of where we have been all along.

A study of a widespread esoteric tradition in medieval China called the Way of highest Clarity (Shangqing dao) with translations of three of its important texts and essays on its doctrines regarding nature, vision, and revelation.

This book is aimed at engineering academics worldwide, who are attempting to bring social justice into their work and practice, or who would like to but don't know where to start. This is the first book dedicated specifically to University professionals on Engineering and Social Justice, an emerging and exciting area of research and practice. An international team of multidisciplinary authors share their insights and invite and inspire us to reformulate the way we work. Each chapter is based on research and yet presents the outcomes of scholarly studies in a user oriented style. We look at all three areas of an engineering academic's professional role: research, teaching and community engagement. Some of our team have created classes which help students think through their role as engineering practitioners in society. Others are focusing their research on outcomes that are socially just and for client groups who are marginalized and powerless. Yet others are consciously engaging local community groups and exploring ways in which the University

might 'serve' communities at home and globally from a post-development perspective. We are additionally concerned with the student cohort and who has access to engineering studies. We take a broad social and ecological justice perspective to critique existing and explore alternative practices. This book is a handbook for any engineering academic, who wishes to develop engineering graduates as well as technologies and practices that are non-oppressive, equitable and engaged. It is also an essential reader for anyone studying in this interdisciplinary juncture of social science and engineering. Scholars using a critical theoretical lens on engineering practice and education, from Science and Technology Studies, History and Philosophy of Engineering, Engineering and Science Education will find this text invaluable.

This book presents written versions of the eight lectures given during the AMS Short Course held at the Joint Mathematics Meetings in Washington, D.C. The objective of this course was to share with the scientific community the many exciting mathematical challenges arising from the new field of quantum computation and quantum information science. The course was geared toward demonstrating the great breadth and depth of this mathematically rich research field. Interrelationships with existing mathematical research areas were emphasized as much as possible. Moreover, the course was designed so that participants with little background in quantum mechanics would, upon completion, be prepared to begin reading the research literature on quantum computation and quantum information science. Based on audience feedback and questions, the written versions of the lectures have been greatly expanded, and supplementary material has been added. The book features an overview of relevant parts of quantum mechanics with an introduction to quantum computation, including many potential quantum mechanical computing devices; introduction to quantum algorithms and quantum complexity theory; in-depth discussion on quantum error correcting codes and quantum cryptography; and, finally, exploration into diverse connections between quantum computation and various areas of mathematics and physics. This book is the companion volume to "Quantum Computation and Quantum Information, CONM/305", Volume 305 in the "Contemporary Mathematics" series.

Quantum mechanics, the subfield of physics that describes the behavior of very small (quantum) particles, provides the basis for a new paradigm of computing. First proposed in the 1980s as a way to improve computational modeling of quantum systems, the field of quantum computing has recently garnered significant attention due to progress in building small-scale devices. However, significant technical advances will be required before a large-scale, practical quantum computer can be achieved. *Quantum Computing: Progress and Prospects* provides an introduction to the field, including the unique characteristics and constraints of the technology, and assesses the feasibility and implications of creating a functional quantum computer capable of addressing real-world problems. This report considers hardware and software requirements, quantum algorithms, drivers of advances in quantum computing and quantum devices, benchmarks associated with relevant use cases, the time and resources required, and how to assess the probability of success. This seventh, revised edition of the IMF Glossary: English-French-Spanish contains approximately 4,000 records that are believed to be the most useful to translators dealing with IMF material. The main body of the Glossary consists of terms, phraseological units, and institutional titles covering areas such as macroeconomics, money and banking, public finance, taxation, balance of payments, statistics, accounting, and economic development. It contains terminology relating to the IMF's organization and operations, as well as from the Articles of Agreement, By-Laws, Rules and Regulations, and other major IMF publications. Since the Glossary is concept-based, synonyms are consolidated into one single entry. Cross-references refer to the main entry under which the various synonyms are listed ("see") and also draw the user's attention to terms that are related but not synonyms ("see also"). Currency units of countries and monetary unions, an IMF organizational chart in the three languages, and color-coded French and Spanish indexes are provided in appendixes. *Arctic Geopolitics, Media and Power* provides a fresh way of looking at the potential and limitations of regional international governance in the Arctic region. Far-reaching impacts of climate change, its wealth of resources and potential for new commercial activities have placed the Arctic region into the political limelight. In an era of rapid environmental change, the Arctic provides a complex and challenging case of geopolitical interplay. Based on analyses of how actors from within and outside the Arctic region assert their interests and how such discourses travel in the media, this book scrutinizes the social and material contexts within which new imaginaries, spatial constructs and scalar preferences emerge. It places ground-breaking attention to shifting media landscapes as a critical component of the social, environmental and technological change. It also reflects on the fundamental dilemmas inherent in democratic decision making at a time when an urgent need for addressing climate change is challenged by conflicting interests and growing geopolitical tensions. This book will be of great interest to geography academics, media and communication studies and students focusing on policy, climate change and geopolitics, as well as policy-makers and NGOs working within the environmental sector or with the Arctic region. The Open Access version of this book, available at <http://www.tandfebooks.com/doi/view/10.4324/9780367189822> has been made available under a Creative Commons Attribution-Non Commercial-No Derivatives 4.0 license.

This book is an introduction to combinatorial torsions of cellular spaces and manifolds with special emphasis on torsions of 3-dimensional manifolds. The first two chapters cover algebraic foundations of the theory of torsions and various topological constructions of torsions due to K. Reidemeister, J.H.C. Whitehead, J. Milnor and the author. We also discuss connections between the torsions and the Alexander polynomials of links and 3-manifolds. The third (and last) chapter of the book deals with so-called refined torsions and the related additional structures on manifolds, specifically homological orientations and Euler structures. As an application, we give a construction of the multivariable Conway polynomial of links in homology 3-spheres. At the end of the book, we briefly describe the recent results of G. Meng, C.H. Taubes and the author on the connections between the refined torsions and the Seiberg-Witten invariant of 3-manifolds. The exposition is aimed at students, professional mathematicians and physicists interested in combinatorial aspects of topology and/or in low dimensional topology. The necessary background for

the reader includes the elementary basics of topology and homological algebra.

This book constitutes the proceedings of the First International Conference on Quantum Communication and Quantum Networking, QuantumCom 2009, held in Naples, Italy, in October 2009. The 38 full papers were selected from numerous submissions. This conference has been devoted to the discussion of new challenges in quantum communication and quantum networking that extends from the nanoscale devices to global satellite communication networks. It placed particular emphasis on basic quantum science effects and on emerging technological solutions leading to practical applications in the communication industry, culminating with a special section on Hybrid Information Processing.

The open research center project "Interdisciplinary fundamental research toward realization of a quantum computer" has been supported by the Ministry of Education, Japan for five years. This is a collection of the research outcomes by the members engaged in the project. To make the presentation self-contained, it starts with an overview by Mikio Nakahara, which serves as a concise introduction to quantum information and quantum computing. Subsequent contributions include subjects from physics, chemistry, mathematics, and information science, reflecting upon the wide variety of scientists working under this project. These contributions introduce NMR quantum computing and related techniques, number theory and coding theory, quantum error correction, photosynthesis, non-classical correlations and entanglement, neutral atom quantum computer, among others. Each of the contributions will serve as a short introduction to these cutting edge research fields.

Tracing the emergence and evolution of the modern discourse on boredom in French and German literary, philosophical, and sociological texts, this book fills a gap in the intellectual and cultural history of European modernity.

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