Lectures On Quantum Information By Dagmar Bruss

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Lectures on Quantum Information | Dagmar Bruß, Gerd Leuchs ...

Course description: This two-term course covers quantum information theory, quantum algorithms, quantum error correction, quantum Shannon theory, and some special topics. Class meetings : Monday and Wednesday 2:30-3:55 in 107 Downs, beginning 2 October 2019. Instructor: John Preskill , 206 Annenberg, X-6691, email: preskill (at) caltech (dot) edu.

Ph219/CS219 Quantum Computation

Lecture 13: Quantum circuits Lecture 14: Reversible computing Lecture 15: Quantum cryptography (Guest lecture: Subhayan Roy Moulik [Oxford]) Lecture 16: Quantum query complexity Lecture 17: Deutsch's algorithm Lecture 18: The Deutsch-Jozsa algorithm Lecture 19: The Bernstein-Vazirani algorithm Lecture 20: Fourier analysis of Boolean functions & Fourier sampling Lecture 21: Grover▯s algorithm (Part I) Lecture 22: Grover▯s algorithm (Part II) Lecture 23: Simon▯s algorithm (Part I ...

CS419: Quantum Computing

2 November, 2020. (Image: CERN) A series of weekly lectures on the basics of quantum computing will be broadcast via webcast starting 6 November 2020 at 10.30 a.m. New lectures will be broadcast each Friday of the next seven weeks. The talks will focus on the practical aspects of quantum computing and are organised by CERN openlab and the CERN Quantum Technology Initiative.

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Lectures on Quantum Information: Bruss, Dagmar, Leuchs ...

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Lectures on Quantum Information - Dagmar Bruss, Gerd ...

Lectures on Quantum Information Editors: D. Bruss, G. Leuchs WILEY-VCH Verlag Berlin GmbH July 13, 2005

Lectures on Quantum Information

Quantum mechanics is one of the principle pillars of modern physics. It also remains a topic of great interest to mathematicians. Since its discovery it has inspired and been inspired by many topics within modern mathematics, including functional analysis and operator algebras, Lie groups, Lie algebras and their representations, principle bundles, distribution theory, and much more.

Lectures on Quantum Mechanics by Philip L. Bowers

Lectures on Quantum Information. Dagmar Bruss (Editor), Gerd Leuchs (Editor) ISBN: 978-3-527-40527-5. 634 pages. December 2006. View Most Recent Edition of This Title. Read an Excerpt . Description. Quantum Information Processing is a young and rapidly growing field of research at the intersection of physics, mathematics, and computer science. ...

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John Preskill, Richard P. Feynman Professor of Theoretical Physics at the California Institute of Technology, gave a lecture about Introduction to Quantum In...

John Preskill - Introduction to Quantum Information (Part ...

Published on Sep 10, 2018 In 2017 Reinhard Werner gave a series of lectures on the mathematical methods of quantum information theory at the Leibniz Universität Hannover. These lectures were...

Mathematical methods of quantum information theory, Lecture 1

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Lectures on Quantum Information by Dagmar Bruss: New PAP ...

Qubits and quantum information. Quantum information differs strongly from classical information, epitomized by the bit, in many striking and unfamiliar ways.While the fundamental unit of classical information is the bit, the most basic unit of quantum information is the qubit.Classical information is measured using Shannon entropy, while the quantum mechanical analogue is Von Neumann entropy.

Quantum Information Processing is a young and rapidly growing field of research at the intersection of physics, mathematics, and computer science. Its ultimate goal is to harness quantum physics to conceive -- and ultimately build -- "quantum" computers that would dramatically overtake the capabilities of today's "classical" computers. One example of the power of a quantum computer is its ability to efficiently find the prime factors of a larger integer, thus shaking the supposedly secure foundations of standard encryption schemes. This comprehensive textbook on the rapidly advancing field introduces readers to the fundamental concepts of information theory and quantum entanglement, taking into account the current state of research and development. It thus covers all current concepts in quantum computing, both theoretical and experimental, before moving on to the latest implementations of quantum computing and communication protocols. With its series of exercises, this is ideal reading for students and lecturers in physics and informatics, as well as experimental and theoretical physicists, and physicists in industry. Dagmar Bruß graduated at RWTH University Aachen, Germany, and received her PhD in theoretical particle physics from the University of Heidelberg in 1994. As a research fellow at the University of Oxford she started to work in quantum information theory. Another fellowship at ISI Torino, Italy, followed. While being a research assistant at the University of Hannover she completed her habilitation. Since 2004 Professor Bruß has been holding a chair at the Institute of Theoretical Physics at the Heinrich-Heine-University Dûsseldorf, Germany. Gerd Leuchs studied physics and mathematics at the University of Cologne, Germany, and received his Ph.D. in 1978. After two research visits at the University of Colorado in Boulder, USA, he headed the German gravitational wave detection group from 1985 to 1989. He became technical director at Nanomach AG in Switzerland. Since 1994 Professor Leuchs has been holding the chair for optics at the Friedrich-Alexander-University of Erlangen-Nuremberg, Germany. His fields of research span the range from modern aspects of classical optics to quantum optics and quantum information. Since 2003 he has been Director of the Max Planck Research Group for Optics, Information and Photonics at Erlangen.

This comprehensive textbook on the rapidly advancing field introduces readers to the fundamental concepts of information theory and quantum entanglement, taking into account the current state of research and development. It thus covers all current concepts in quantum computing, both theoretical and experimental, before moving on to the latest implementations of quantum computing and communication protocols. It contains problems and exercises and is therefore ideally suited for students and lecturers in physics and informatics, as well as experimental and theoretical physicists in academia and industry who work in the field of quantum information processing. The second edition incorporates important recent developments such as quantum metrology, quantum correlations beyond entanglement, and advances in quantum computing with solid state devices.

"Nobel Laureate Steven Weinberg combines his exceptional physical insight with his gift for clear exposition to provide a concise introduction to modern quantum mechanics. Ideally suited to a one-year graduate course, this textbook is also a useful reference for researchers. Readers are introduced to the subject through a review of the history of quantum mechanics and an account of classic solutions of the Schrèodinger equation, before quantum mechanics is developed in a modern Hilbert space approach. The textbook covers many topics not often found in other books on the subject, including alternatives to the Copenhagen interpretation, Bloch waves and band structure, the Wigner-Eckart theorem, magic numbers, isospin symmetry, the Dirac theory of constrained canonical systems, general scattering theory, the optical theorem, the 'in-in' formalism, the Berry phase, Landau levels, entanglement and quantum computing. Problems are included at the ends of chapters, with solutions available for instructors at www.cambridge.org/9781107028722"--

Quantum information science is a rapidly developing field that not only promises a revolution in computer sciences but also touches deeply the very foundations of quantum physics. This book consists of a set of lectures by leading experts in the field that bridges the gap between standard textbook material and the research literature, thus providing the ne- cessary background for postgraduate students and non-specialist researchers wishing to familiarize themselves with the subject thoroughly and at a high level. This volume is ideally suited as a course book for postgraduate students, and lecturers will find in it a large choice of material for bringing their courses up to date.

This short and concise primer takes the vantage point of theoretical physics and the unity of physics. It sets out to strip the burgeoning field of quantum information science to its basics by linking it to universal concepts in physics. An extensive lecture rather than a comprehensive textbook, this volume is based on courses delivered over several years to advanced undergraduate and beginning graduate students, but essentially it addresses anyone with a working knowledge of basic quantum physics. Readers will find these lectures a most adequate entry point for theoretical studies in this field. For the second edition, the authors has succeeded in adding many new topics while sticking to the conciseness of the overall approach. A new chapter on qubit thermodynamics has been added, while new sections and subsections have been incorporated in various chapter to deal with weak and time-continuous measurements, period-finding quantum algorithms and quantum error corrections. From the reviews of the first edition: "The best things about this book are its brevity and clarity. In around 100 pages it provides a tutorial introduction to quantum information theory, including problems and solutions. ... it▯s worth a look if you want to quickly get up to speed with the language and central concepts of quantum information theory, including the background classical information theory." (Craig Savage, Australian Physics, Vol. 44 (2), 2007)

Lecture Notes for Physics 229:Quantum Information and ComputationBy John Preskill

Formal development of the mathematical theory of quantum information with clear proofs and exercises. For graduate students and researchers.

This book provides readers with a concise introduction to current studies on operator-algebras and their generalizations, operator spaces and operator systems, with a special focus on their application in quantum information science. This basic framework for the mathematical formulation of quantum information can be traced back to the mathematical work of John von Neumann, one of the pioneers of operator algebras, which forms the underpinning of most current mathematical treatments of the quantum theory, besides being one of the most dynamic areas of twentieth century functional analysis. Today, von Neumann▯s foresight finds expression in the rapidly growing field of quantum information theory. These notes gather the content of lectures given by a very distinguished group of mathematicians and quantum information theorists, held at the IMSc in Chennai some years ago, and great care has been taken to present the material as a primer on the subject matter. Starting from the basic definitions of operator spaces and operator systems, this text proceeds to discuss several important theorems including Stinespring▯s dilation theorem for completely positive maps and Kirchberg▯s theorem on tensor products of C*-algebras. It also takes a closer look at the abstract characterization of operator systems and, motivated by the requirements of different tensor products in quantum information theory, the theory of tensor products in operator systems is discussed in detail. On the quantum information side, the book offers a rigorous treatment of quantifying entanglement in bipartite quantum systems, and moves on to review four different areas in which ideas from the theory of operator systems and operator algebras play a natural role: the issue of zero-error communication over quantum channels, the strong subadditivity property of quantum entropy, the different norms on quantum states and the corresponding induced norms on quantum channels, and, lastly, the applications of matrix-valued random variables in the quantum information setting.

This book is a collection of lecture notes from the Symposium on Quantum Computing, Thermodynamics, and Statistical Physics, held at Kinki University in March 2012. Quantum information theory has a deep connection with statistical physics and thermodynamics. This volume introduces some of the topics on interface among the mentioned fields. Subjects included in the lecture notes include quantum annealing method, nonequilibrium thermodynamics and spin glass theory, among others. These subjects were presented with much emphasis put in its relevance in quantum information theory. These lecture notes are prepared in a self-contained manner so that a reader with modest background may understand the subjects.

Quantum information is an area of science, which brings together physics, information theory, computer science & mathematics. This book, which is based on two successful lecture courses, is intended to introduce readers to the ideas behind new developments including quantum cryptography, teleportation & quantum computing.

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