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the emerging area of quantum technology. Written in a consistent style, the book introduces quantum cryptography, quantum teleportation, and quantum computation, considering both theory and the latest experiments.

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Bouwmeester, Dirk,
Ekert, Artur K.,
Zeilinger, Anton ...

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Information:

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Cryptography ...

Fundamentals of
quantum

information. 01 Mar
1998. The fact that

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Quantum information is physical means that the laws of quantum mechanics can be used to process and transmit it in ways that are not possible with existing systems, says Anton Zeilinger. An entangled state.

Fundamentals of
quantum information

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Quantum World

Leading experts from
The Physics of
Quantum

Information network,
a European
Commission
initiative, bring
together the most
recent results from
the emerging area of
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Cryptography ...

The core theme of this thesis is that quantum information is in a certain sense a combination of two pieces of classical information, information about two physical observables which are complementary in

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thesense first
putforthbyBohr [1, 2,
3]andexemplified
bythewave-particle
duality in the double-
slit experiment.

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convey a through

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and authoritative
picture of the state of
this fascinating
futuristic art as we
enter the 21st
century." - American
Scientist "This
volume covers
Quantum
Cryptography
Quantum
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Computation.

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Quantum
cryptography is a
beautiful idea! It
covers aspects from
fundamental
quantum physics to
Applied Physics via
classical and
quantum information

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theories [1]. During
me last ten years,
quantum
cryptography
progressed
tremendously, in all
directions: from
mathematical
security proofs of
idealized scenarii to
commercial
prototypes.

Quantum

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Information Theory -
an overview |
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Quantum Physics,
Thermodynamics,
and Information The
core creative process
in the universe
involves quantum
mechanics and
thermodynamics. To
understand
information creation,
information physics

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provides new insights
into the puzzling "
problem of
measurement " and
the mysterious "
collapse of the wave
function " in
quantum mechanics.

Quantum Physics,
Thermodynamics,
and Information
In physics and
computer science,

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Quantum information is the information of the state of a quantum system. It is the basic entity of study in quantum information theory, and can be manipulated using quantum information processing techniques. Quantum information refers to both the technical

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Quantum information in terms of
Von Neumann entropy and the
general computational term.

Quantum information, like
classical information,
can be processed
using digital
computers,
transmitted from one
location to another

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Physical information is a form of information. In physics, it refers to the information of a physical system. Physical information is an important concept used in a number of fields of study in

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physics. For example, in quantum mechanics, the form of physical information known as quantum information is used to describe quantum phenomena such as entanglement and superposition.

Physical information -
Wikipedia

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The coming quantum revolution. Like AI, quantum information science and engineering (QISE) is a rapidly evolving field with tremendous potential benefits. Quantum mechanics describes the laws of physics at microscopic length scales, and QISE researchers like me

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endeavour to control the systems that obey these fundamental laws. By doing so, we hope to engineer novel quantum devices such as quantum sensors, networks or computers, as well as novel quantum materials with properties that don ' t ...

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Part of the revolution:
Black representation
in AI and ...

Experimental test of
the relation between
coherence and path
information.

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Physics 1 (2018) J
Gao, ZQ Jiao, CQ Hu
et al. Probing
quantum features of
photosynthetic

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organisms. NPJ

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(2018) ARTN 60. T

Krisnanda, C

Marletto, V Vedral et

al. Electrically

controlled nuclear

polarization of

individual atoms

Quantum

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University of Oxford

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Department of ...

Information is stored, transmitted and processed by physical means. Thus, the concept of information and computation can be formulated in the context of a physical theory and the study of information requires ultimately experimentation. This

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Quantum information, innocuous at first glance, leads to non-trivial consequences.

Following Moore's law, about every 18 months microprocessors double their speed ...

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Quantum

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The coming quantum revolution. Like AI, quantum information science and engineering (QISE) is a rapidly evolving field with tremendous potential benefits. Quantum mechanics describes the laws of physics at microscopic length scales, and QISE

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researchers like me
(Charles Brown)
endeavor to control
the systems that
obey these
fundamental laws. By
doing so, we hope to
engineer novel
quantum devices
such as quantum
sensors, networks, or
computers as well as
novel quantum
materials with ...

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Part of the revolution:
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If you are familiar

with quantum

physics, you know

that on very tiny

scales, the Universe is

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very weird. Particles
act like particles and
waves at the same
time. An electron
may be in one
location,...

Quantum Physics
May Upend Our
Macroscopic Reality
In The ...

In quantum
computing, which
relies on quantum

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bits, or qubits, to carry information, the fragile state known as quantum superposition is difficult to maintain and can decay over time, causing a ...

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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

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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.

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recent results from
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Quantum 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

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Quantum advanced students
will find a rich source
of information on this
exciting new area.

Bouwmeester

First-ever
comprehensive
introduction to the
major new subject of
quantum computing
and quantum
information.

Quantum

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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

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Quantum
including quantum
cryptography,
teleportation &
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quantum computing.

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A new and exciting
approach to the
basics of quantum
theory, this
undergraduate
textbook contains
extensive discussions
of conceptual puzzles
and over 800

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Quantum
exercises and
problems. Beginning
with three
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systems, the book
develops the
formalism of
quantum theory,
addresses questions
of measurement and
distinguishability,
and explores the
dynamics of quantum
systems. In addition

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to the standard
topics covered in
other textbooks, it
also covers
communication and
measurement,
quantum
entanglement,
entropy and
thermodynamics, and
quantum information
processing. This
textbook gives a
broad view of

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Quantum theory by
emphasizing
dynamical evolution,
and exploring
conceptual and
foundational issues.

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contemporary topics,
including
measurement, time
evolution, open
systems, quantum
entanglement, and
the role of

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Developing many of
the major, exciting,
pre- and post-
millennium

developments from
the ground up, this
book is an ideal entry
point for graduate
students into
quantum information
theory. Significant
attention is given to

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Quantum mechanics
for quantum
information theory,
and careful studies of
the important
protocols of
teleportation,
superdense coding,
and entanglement
distribution are
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new material,
including detailed
discussions of Bell's
theorem, the CHSH
game, Tsirelson's
theorem, the
axiomatic approach
to quantum channels,
the definition of the
diamond norm and
its interpretation, and
a proof of the
Choi–Kraus
theorem. Discussion

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of the importance of the quantum dynamic capacity formula has been completely revised, and many new exercises and references have been added. This new edition will be welcomed by the upcoming generation of quantum information theorists

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and the already
established
community of
classical information
theorists.

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

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This book approaches condensed matter physics from the perspective of quantum information science, focusing on systems with strong interaction and unconventional order for which the usual condensed matter methods like the Landau paradigm or

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the free fermion
framework break
down. Concepts and
tools in quantum
information science
such as
entanglement,
quantum circuits, and
the tensor network
representation prove
to be highly useful in
studying such
systems. The goal of
this book is to

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introduce these techniques and show how they lead to a new systematic way of characterizing and classifying quantum phases in condensed matter systems. The first part of the book introduces some basic concepts in quantum information theory which are then used to study

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the central topic explained in Part II: local Hamiltonians and their ground states. Part III focuses on one of the major new phenomena in strongly interacting systems, the topological order, and shows how it can essentially be defined and characterized in terms of

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Quantum Entanglement. Part IV
shows that the key
entanglement
structure of
topological states can
be captured using
the tensor network
representation,
which provides a
powerful tool in the
classification of
quantum phases.
Finally, Part V
discusses the exciting

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prospect at the intersection of quantum information and condensed matter physics—the unification of information and matter. Intended for graduate students and researchers in condensed matter physics, quantum information science and related fields, the

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book is self-
contained and no
prior knowledge of
these topics is
assumed.

This book presents
the basics of
quantum
information, e.g.,
foundation of
quantum theory,
quantum algorithms,
quantum

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entanglement,
quantum entropies,
quantum coding,
quantum error
correction and
quantum
cryptography. The
required knowledge
is only elementary
calculus and linear
algebra. This way the
book can be
understood by
undergraduate

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students. In order to study quantum information, one usually has to study the foundation of quantum theory. This book describes it from more an operational viewpoint which is suitable for quantum information while traditional textbooks of quantum theory

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lack this viewpoint.

The current book
bases on Shor's
algorithm, Grover's
algorithm, Deutsch-
Jozsa's algorithm as
basic algorithms. To
treat several topics in
quantum
information, this
book covers several
kinds of information
quantities in
quantum systems

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including von Neumann entropy. The limits of several kinds of quantum information processing are given. As important quantum protocols, this book contains quantum teleportation, quantum dense coding, quantum data compression. In

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Quantum particular conversion theory of entanglement via local operation and classical communication are treated too. This theory provides the quantification of entanglement, which coincides with von Neumann entropy. The next part treats the quantum

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hypothesis testing.

The decision problem of two candidates of the unknown state

are given. The

asymptotic

performance of this problem is

characterized by information

quantities. Using this result, the optimal

performance of

classical information

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transmission via
noisy quantum
channel is derived.

Quantum

information

transmission via
noisy quantum
channel by quantum
error correction are
discussed too. Based
on this topic, the
secure quantum
communication is
explained. In

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particular, the
quantification of
quantum security
which has not been
treated in existing
book is explained.
This book treats
quantum
cryptography from a
more practical
viewpoint.

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