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Note generali	Description based upon print version of record.
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Nota di contenuto	Introduction -- Finite Resource Information Theory 1.2 Motivating Example -- Outline of the Book -- Modeling Quantum Information -- General Remarks on Notation -- Linear Operators and Events -- Functionals and States -- Multi-Partite Systems -- Functions on Positive Operators -- Quantum Channels -- Background and Further Reading -- Norms and Metrics -- Norms for Operators and Quantum States -- Trace Distance -- Fidelity -- Purified Distance -- Background and Further Reading -- Quantum Rényi Divergence -- Classical Rényi Divergence -- Classifying Quantum Rényi Divergences -- Minimal Quantum Rényi Divergence -- Petz Quantum Rényi Divergence -- Background and Further Reading -- Conditional Rényi Entropy -- Conditional Entropy from Divergence -- Definitions and Properties.- Duality Relations and their Applications -- Chain Rules -- Background and Further Reading -- Smooth Entropy Calculus -- Min- and Max-Entropy -- Smooth Entropies -- Properties of the Smooth Entropies --

Fully Quantum Asymptotic Equipartition Property -- Background and Further Reading -- Selected Applications -- Binary Quantum Hypothesis Testing -- Entropic Uncertainty Relations -- Randomness Extraction -- Background and Further Reading -- A Some Fundamental Matrix Analysis Results -- References.

Sommario/riassunto

This book provides the reader with the mathematical framework required to fully explore the potential of small quantum information processing devices. As decoherence will continue to limit their size, it is essential to master the conceptual tools which make such investigation possible. A strong emphasis is given to information measures that are essential for the study of devices of finite size, including Rényi entropies and smooth entropies. The presentation is self-contained and includes rigorous and concise proofs of the most important properties of these measures. The first chapters will introduce the formalism of quantum mechanics, with particular emphasis on norms and metrics for quantum states. This is necessary to explore quantum generalizations of Rényi divergence and conditional entropy, information measures that lie at the core of information theory. The smooth entropy framework is discussed next and provides a natural means to lift many arguments from information theory to the quantum setting. Finally selected applications of the theory to statistics and cryptography are discussed. The book is aimed at graduate students in Physics and Information Theory. Mathematical fluency is necessary, but no prior knowledge of quantum theory is required.