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Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction -- Quantum Mechanics and Quantum Estimation — Background and Problems in Quantum Estimation -- Mathematical Statistics — Basic Concepts and Theoretical Tools for Finite Sample Analysis -- Evaluation of Estimation Precision in Test of Bell-type Correlations -- Evaluation of Estimation Precision in Quantum Tomography -- Improvement of Estimation Precision by Adaptive Design of Experiments -- Summary and Outlook.
Sommario/riassunto	In this thesis, the author explains the background of problems in quantum estimation, the necessary conditions required for estimation precision benchmarks that are applicable and meaningful for evaluating data in quantum information experiments, and provides examples of

such benchmarks. The author develops mathematical methods in quantum estimation theory and analyzes the benchmarks in tests of Bell-type correlation and quantum tomography with those methods. Above all, a set of explicit formulae for evaluating the estimation precision in quantum tomography with finite data sets is derived, in contrast to the standard quantum estimation theory, which can deal only with infinite samples. This is the first result directly applicable to the evaluation of estimation errors in quantum tomography experiments, allowing experimentalists to guarantee estimation precision and verify quantitatively that their preparation is reliable.