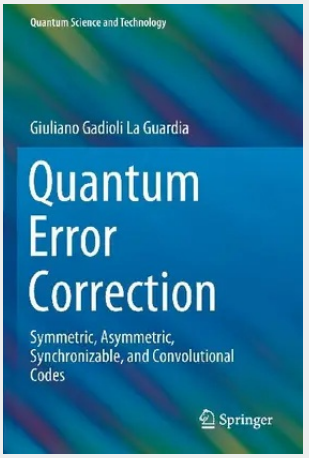
La Guardia

Quantum Error Correction

Symmetric, Asymmetric, Synchronizable, and Convolutional Codes



This text presents an algebraic approach to the construction of several important families of quantum codes derived from classical codes by applying the well-known Calderbank-Shor-Steane (CSS), Hermitian, and Steane enlargement constructions to certain classes of classical codes. In addition, the book presents families of asymmetric quantum codes with good parameters and provides a detailed description of the procedures adopted to construct families of asymmetric quantum convolutional codes.

Featuring accessible language and clear explanations, the book is suitable for use in advanced undergraduate and graduate courses as well as for self-guided study and reference. It provides an expert introduction to algebraic techniques of code construction and, because all of the constructions are performed algebraically, it enables the reader to construct families of codes, rather than only codes with specific parameters. The text offers an abundance of worked examples, exercises, andopen-ended problems to motivate the reader to further investigate this rich area of inquiry. End-of-chapter summaries and a glossary of key terms allow for easy review and reference.

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