Quantum Information Theory
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Universität Tübingen
Ángela Capel
Paul Gondolf

List of topics

1. **Classical cost of Transmitting a Qubit.** Based on the paper by Renner, Tavakoli and Quintino. Extending the knowledge of Chapter 2. link
2. **Duality between quantum teleportation and superdense coding.** Based on the paper by Leditzky and Chitambar. Extending the knowledge of Chapter 2. link
3. **Non-local games.** Extending the knowledge of Chapter 2.
4. **Grothendieck's theorem.** Extending the knowledge of Chapter 2.
5. **Relation between different classes of correlations.** Extending the knowledge of Chapter 2.
6. **Experimental verification of Bell inequalities.** Experiments that have been awarded the Physics Nobel Award in 2022.
7. **Hamiltonian simulation via block encoding.** Based on the technique of 'singular-value transformation' from the paper by Gilyen, Su, Low and Wiebe. Extending the knowledge of Chapter 4. link
8. **The HHL algorithm.** Algorithm to solve linear systems of equations, from the paper by Harrow, Hassidim and Lloyd. Extending the knowledge of Chapter 4. link
9. **Quantum complexity theory.** An overview on quantum complexity theory. Chapter 13 of link
10. **Quantum-Merlin-Arthur (QMA) and the local Hamiltonian problem.** Beginning of Chapter 14 of link
11. **Quantum stabilizer codes. The toric code.** Extending the knowledge of the chapter on error correction.
12. **Quantum stabilizer codes. The color code.** Extending the knowledge of the chapter on error correction.
13. **Introduction to post-quantum cryptography.** Hash-based cryptography. Extending the knowledge of the chapter about cryptography.
14. **Introduction to post-quantum cryptography.** Code-based cryptography. Extending the knowledge of the chapter about cryptography.
15. **Introduction to post-quantum cryptography.** Lattice-based cryptography. Extending the knowledge of the chapter about cryptography.