Quantum Open Systems and Quantum Information

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Contents

- I. Completely positive maps and quantum channels Mathematical properties of quantum channels, Kraus representation, unitary dilations, entropy and H-theorem.
- II. Quantum dynamical semigroups and stability problems General form of semigroup generators, thermal generators. Thermal generators for Ising models, metastable states.
- III. Quantum memories and fault-tolerant quantum computations Models of quantum computation. Stability of quantum information. Kitaev spin models as quantum memories.
- IV. Thermodynamics of information processing Landauer's principle and the second law. Stability versus irreversibility of information processing - an exactly solvable model. Open problems.