

Introduction to Quantum Error Correction: Schrödinger meets Maxwell's Demon

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A 'second quantum revolution' is underway based on our new understanding of how information can be stored and manipulated using quantum hardware. Even more remarkable than the concept of quantum computation is the concept of quantum error correction. We know that measurement 'back action' disturbs a quantum state when we observe it. Nevertheless, it is possible to store an unknown quantum state and, if it develops errors due to imperfect hardware, we can measure and correct such errors to recover the original unknown state. Crucially, we must be able to do this without ever learning anything about that unknown state. This talk will present an elementary introduction to the basic theoretical concepts underlying quantum error correction for discrete systems (qubits) as well as for continuous-variable systems (harmonic oscillators).