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Holography as quantum error correction

Two profound ideas, quantum error correction and holography have recently been found to be deeply connected. Quantum error correction shows that reliable quantum information storage can be achieved from imperfect physical components. Holography is a duality between two distinct description of a quantum systems with the exact same predictions. The first is the prevailing description of our universe which includes gravity and quantum theory. The second description allows a solid mathematical foundation through a quantum field theory at lower spatial dimension. Quantum information tools such as entanglement, quantum error correction and compression have proven useful tools to gain high level understanding of this duality. Conversely, the holographic duality is suggesting directions in quantum information requiring further exploration. In this talk, I will introduce some of these connections, describe explicit toy models which exhibit some properties expected in holography and explore the implications of holographic predictions from a code-theoretic perspective.