

## **Holography, and quantum gravity**

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**Abstract:** At a fundamental level, nature is inevitably described by a quantum theory of gravity. A crucial insight from the 1990s was that the fundamental degrees of quantum gravity are very strange and highly non-local, and can all be imagined to live on a screen which has one dimension less than space-time itself, hence the name holographic screen. This notion of holography, which has been made completely quantitative in the context of string theory, has dramatically altered our understanding of quantum gravity. I will review this idea and its concrete implementation, and describe how it implies that space and time must be emergent phenomena. I will also summarize our present understanding of quantum black holes, and sketch some recent attempts to use holography and black holes to understand things as diverse as the quark-gluon plasma and high-Tc superconductors.