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Holographic Principle, String Theory, and Grand Unification Theory

String theory is the prime candidate for the quantum gravity. However, so far, the principle and symmetry that lead to string theory remain unknown. In this paper, we propose holographic principle as the fundamental principle and symmetry. We find that it is possible to derive string action, quantum physics, and general relativity from holographic principle. We introduce the concept of elementary information, which is the basic universal information, as the essential element underlying and creating all physical phenomena. We propose that 2-dimensional spacetime is the hologram that encodes the elementary information. We derive the holographic action which describes the maximum amount of information encoded on the hologram. We demonstrate how physical phenomena and laws of physics, such as elementary particles, gravity, gauge interactions, dark energy, dark matter, cosmological constant, dynamics of spacetime compactification, large hierarchy between Planck scale and weak scale, entropy of black hole and dynamics inside black hole, may emerge from the hologram. This work provides a way to derive “it from bit”, i.e. all physical phenomena are the projection from the hologram. It provides a way to derive grand unification theory from holographic principle.

Is this abstract from experiment?

No

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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Internet talk

No

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