Holography Principle: New Paradigm of Theoretical Physics

By
Prof Bum-Hoon Lee
Sogang University
President of Asia Pacific Center for Theoretical Physics (APCTP)

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Abstract

Physical phenomena of strongly interacting systems, which do not allow the traditional perturbative approach, have been a big challenge. Such phenomena occur in almost all branches of physics, such as nuclear and particle physics and strongly correlated phenomena in the condensed matter systems, etc. Holography principle, discovered from the recent progress in the string theory, may provide totally new paradigm for understanding many such systems. This principle transforms the question on the quantum physical system into that on the classical geometry by relating the strongly interacting quantum field theory with the corresponding effective classical gravity theory in one-dimension higher space-time. After introducing this principle, we present some explicit examples of application: Nuclear physics, explaining the spectra, phase structures, and the density effects among others. Application to the strongly correlated phenomena in condensed matter will also be briefly mentioned.

Short Biography

Professor Bum-Hoon Lee received his bachelor’s and master’s degrees in physics from Seoul National University and a Ph.D. from Columbia University in 1989. After working as a research fellow at the University of North Carolina and the University of Minnesota, he became a professor of physics at Hanyang University in 1990. He then moved to Sogang University in 1996 and founded the Center for Quantum Spacetime in 2005. He served as a trustee and auditor of APCTP from 2010 to 2015 and was appointed as 6th President of APCTP in June 2015. His research field is Quantum Field Theory and Superstring Theory.