

Asymptotic universality in quantum gravity

Prof. Dr. Timo Weigand, DESY, Hamburg

Gravity remains, to date, the most mysterious of the four known fundamental interactions. The quest for a consistent theory of quantum gravity is believed to be deeply intertwined with some of the most pressing outstanding open questions in high energy physics and cosmology. In this colloquium we will review some recent proposals for universal constraints which every effective field theory must obey if it arises as the low-energy limit of a consistent quantum gravity theory. A particularly fruitful point of departure is the study of quantum gravity theories near asymptotic weak coupling.

Both top-down and bottom-up approaches point to a surprising, almost universal behaviour of the effective field theory in such regimes of the moduli space, which is a consequence of certain UV degrees of freedom becoming light.

These and other ideas on quantum gravity can be tested quantitatively within the framework of string theory, making contact with cutting-edge mathematics, and also motivate a new take on fundamental challenges in particle physics and cosmology.