

# String Theory - From Physics to Metaphysics

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## Abstract

Currently, string theory represents the only advanced approach to a unification of all interactions, including gravity. In spite of the more than thirty years of its existence, the sequence of metamorphosis it ran through, and the ever more increasing number of involved physicists, until now, it did not make any empirically testable predictions. Because there are no empirical data incompatible with the quantum field theoretical standard model of elementary particle physics and with general relativity, the only motivations for string theory rest in the mutual incompatibility of the standard model and of general relativity as well as in the metaphysics of the unification program of physics, aimed at a final unified theory of all interactions including gravity. But actually, it is completely unknown which physically interpretable principles could form the basis of string theory. At the moment, "string theory" is no theory at all, but rather a labyrinthic structure of mathematical procedures and intuitions which get their justification from the fact that they, at least formally, reproduce general relativity and the standard model of elementary particle physics as low energy approximations. However, there are now strong indications that string theory does not only reproduce the dynamics and symmetries of our standard model, but a plethora of different scenarios with different low energy nomologies and symmetries. String theory seems to describe not only our world, but an immense landscape of possible worlds. So far, all attempts to find a selection principle which could be motivated intratheoretically remained without success. So, recently the idea that the low energy nomology of our world, and therefore also the observable phenomenology, could be the result of an anthropic selection from a vast arena of nomologically different scenarios entered string theory. Although multiverse scenarios and anthropic selection are not only motivated by string theory, but lead also to a possible explanation for the fine tuning of the universe, they are concepts which transcend the framework defined by the epistemological and methodological rules which conventionally form the basis of physics as an empirical science.

**Keywords:** quantum gravity, string theory, string landscape, anthropic selection

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