LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN | ARNOLD SOMMERFELD CENTER FOR THEORETICAL PHYSICS

Sommerfeld Theory Colloquium

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Mainz University

What String Theory Teaches Us About Scattering amplitudes

In this talk, I will explore the fascinating connections between string theory and quantum field theory, focusing on what we have learned from studying string scattering amplitudes. These insights have not only deepened our understanding of particle interactions but have also led to significant advancements in quantum field theory itself. To set the stage, I will introduce string theory, highlighting its foundational principles and its relationship to low-energy quantum field theories that describe the fundamental forces of nature. Building on this, I will delve into three key conceptsmassive gravity, the double copy framework, and twisted cohomologyall of which have roots in string theory or have been profoundly influenced by it. I will explain how massive gravity emerges as a natural extension in the context of string theory and how the double copy framework elegantly connects gauge theories with gravity, offering a unifying perspective. Twisted cohomology, a sophisticated mathematical tool, will be discussed in relation to the structure of scattering amplitudes and its role in uncovering deeper symmetries. Finally, I will illustrate how these ideas impact our understanding of scattering amplitudes in quantum field theories and how they are applied to describe physics across a wide range of energy scalesfrom the low-energy behavior of known particles to the high-energy frontier. Through these examples, I aim to show how string theory serves as a powerful lens for reimagining and advancing our understanding of particle physics.

Wednesday, 4 December 2024, 16:15h, Room A348, Theresienstr. 37/III

Prof. Dieter Lüst