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Physikalisches Kolloquium

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HS KPH

Mirjam Cvetič
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Modern String Theory Confronting Particle Physics and Black Holes

In the past decades, String Theory has emerged as the prime candidate for quantum unification of electromagnetic, nuclear, and weak forces with gravitational ones. It has shed light on important fundamental questions of theoretical physics, such as the microscopic structure of black holes and the geometric origin of particle physics. We review these developments, such as the introduction of extended objects - Dirichlet branes - and highlight the important geometric role these objects play in deriving the Standard Model of particle physics and the microscopic structure of black holes. We also highlight progress made in deriving particle physics from F-theory, a geometric domain of string theory at finite string coupling, and recent systematic exploration of the landscape of the quadrillion Standard Models with three families of quarks and leptons.

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