



Contribution ID: 80

Type: Poster

Investigating the Top Quark Production by Black Hole Evaporation in pp collisions at the LHC and FCC

Tuesday, March 11, 2025 5:44 PM (2 minutes)

The Standard Model describes the electromagnetic, strong, and weak interactions, but the treatment of gravitational interactions at the quantum level remains an open question. Such an aspect has motivated the proposition of various models for physics beyond the Standard Model, based on the existence of extra spatial dimensions. In these models, the production of black holes in hadronic colliders becomes possible. In this contribution we assume the model proposed by Arkani-Hamed, Dimopoulos, and Dvali (ADD model), which introduces the concept of large compactified extra dimensions, and investigate the formation and subsequent evaporation of black holes in proton-proton collisions at the Large Hadron Collider (LHC) and the Future Circular Collider (FCC). Our analysis will focus on the production of a top quark pair. In particular, we estimate the production of top quarks from black hole evaporation using the Monte Carlo generator BLACKMAX and compare the associated predictions with those obtained with the PYTHIA generator for the top quark production via strong interaction. Results are presented for the rapidity and transverse momentum differential distributions considering the LHC and FCC energies assuming distinct values for the number of extra dimensions and for the mass of the black hole.

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Session Classification: Poster session