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Higgs boson production by Higgs-Strahlung and vector boson fusion processes at a future Muon collider in the context of the bestest Little Higgs model.

Content

In this work, we study the production of the Higgs bosons h_0 and H_0 within the framework of the Bestest Little Higgs Model, a candidate for physics beyond the Standard Model that addresses the hierarchy problem through an extended scalar sector. We analyze six key production processes at a muon collider: $\mu\bar{\mu} \to Zh_0$, $\mu\bar{\mu} \to ZH_0$, $\mu\bar{\mu} \to \nu_\mu\bar{\nu}_\mu h_0$, $\mu\bar{\mu} \to \nu_\mu\bar{\nu}_\mu H_0$, $\mu\bar{\mu} \to \mu\bar{\mu}h_0$, and $\mu\bar{\mu} \to \mu\bar{\mu}H_0$. These include both annihilation channels and vector boson fusion, which are expected to be dominant at high energies.

We consider center-of-mass energies of $\sqrt{s} = 1$, 3, and 10 TeV, and integrated luminosities of 0.3, 1, 4, and 10 ab^{-1}, in alignment with proposed future muon collider scenarios. Our results show that such a collider provides a favorable environment to explore these processes and enhance the discovery potential of new scalar particles. The study highlights the relevance of lepton colliders in probing extended Higgs sectors in scenarios beyond the Standard Model.

Summary

Investigation of h_0 and H_0 production in the Bestest Little Higgs Model at future muon colliders with $\sqrt{s}$ up to 10 TeV.

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