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The Present and Future of Four Top Operators

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The production of four tops at particle colliders is one of the most important probes of the top sector and its connection to physics beyond the SM. In particular, four-top contact interactions give rise to the largest new physics effects at high energies in the case of a strongly interacting top quark. We demonstrate the capabilities of a 100 TeV proton-proton collider to test such non-standard interactions, focusing on the same-sign dilepton and trilepton channels to circumvent large SM backgrounds. Further, we investigate the sensitivity of future high-energy lepton colliders to deformations in top-quark pair production caused by four-top operators. We interpret our results in the context of composite Higgs models, finding the best sensitivity on the compositeness scale for both types of colliders under consideration. Finally, we address the possibility that recent excesses observed by ATLAS and CMS in final states containing multi-leptons and jets are due to new physics in the top sector.

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