

Probing bottom Yukawa couplings at future electron-proton colliders

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The proposed future e^-p collider provides sufficient energies to produce the Standard Model Higgs Boson through W^\pm and Z-boson fusion in charged and neutral current modes, respectively and to measure its properties. We take this opportunity to investigate the prospect of b-quark Yukawa coupling in the Standard Model Effective Field Theory framework and probe down the Wilson coefficients through the process of $e^-p \rightarrow v_l j H$ where the Higgs boson decays to a b-quark pair. The analysis is carried out considering two different center-of-mass energies of 1.3 and 3.46 TeV as the LHeC and FCC-eh benchmarks, including a realistic simulation of the detector response and the main sources of background processes. For background rejection, a multivariate analysis using BDT training method, is performed and the expected limits at 95% CL are derived on the new physics couplings for each benchmark scenario.

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