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Probing standard-model Higgs substructures using tops and weak gauge bosons

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Manifest gauge-invariance requires that observable states in the standard-model are described by composite operators, which involve additional Higgs contributions beyond perturbation theory. This field-theoretical effects has been confirmed in lattice simulations. It has experimentally accessible consequences, of which two will be explored.

One is a non-trivial modification of the off-shell formfactor of the weak vector bosons, effectively increasing the apparent radius of the particles. Results of lattice measurements will be presented, which give an estimate of the size of the effect. It will be discussed how this could be accessed at LHC. The other is an additional Higgs contribution to the structure of the proton. (Differential) measurements of $pp \rightarrow t\bar{t}(Z)$ are used together with HERWIG and CMS analysis setups to constrain this contribution. It is found that a sizable effect is still compatible with the currently available data.

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