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Observable spectrum in the weak sector of the Standard Model

Strict gauge invariance dictates that physical states must be composite, even for the weak sector of the Standard Model. This field-theoretical subtlety is resolved by the Fröhlich-Morchio-Strocchi (FMS) mechanism, which suggests additional Higgs contributions in Standard Model processes. While this has been supported by theoretical investigations in the purely bosonic sector, its implications for fermionic observables require more attention —particularly as these effects could be within reach of current and future experiments.

We investigate a proxy for the weak sector that includes dynamical fermions by employing non-perturbative lattice techniques within a manifestly gauge-invariant approach. We determine the physical spectrum of the theory, collecting further evidence for the validity of the FMS mechanism. Additionally, we systematically explore the parameter space to identify suitable simulation points for calculating scattering cross sections. We also outline the next steps for deriving cross sections from lattice simulations, as has been done previously for vector boson scattering.

Secondary track

T08 - Higgs Physics

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