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Unraveling the Constraints on the Doublet Left-Right Symmetric Model through Analysis of Higgs Boson Data

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In this study, we investigate the constraints imposed on the Doublet Left-Right Symmetric Model (DLRSM) by the latest experimental data on the Higgs boson. While most previous studies have assumed small values for the ratios $r = \kappa_2/\kappa_1$ and $w = v_L/\kappa_1$, we consider the most general scalar potential and explore the constraints on r and w. Through our analysis, we calculate the masses of the CP-even scalars and their couplings to W and Z gauge bosons and third generation quarks. Our results show that there is no lower bound on either r or w, but equating the mass of the lightest CP-even scalar to 125 GeV yields an upper limit of w < 6.7. Additionally, we find that the perturbativity of the Yukawa coupling of the quarks to the Higgs bidoublet sets the upper bounds r < 0.8 and w < 3.5. Our analysis of the Yukawa coupling of the bottom quark to the lightest CP-even scalar strongly disfavors values of r and w < 0.1 and indicates a preference for values of w ~ O(1). Our findings provide important insights into the validity of the DLRSM in the current theoretical and experimental framework.

Collaboration / Activity

Nil

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