

Probing gauge decays of left right symmetric composite fermions

One possibility for new physics beyond the Standard Model (SM) is manifestation of new degrees of freedom through compositeness. Due to internal structure composite fermions should exhibit various excited states, which undergo specific decays to SM gauge bosons which have been studied previously. If however the SM gauge symmetry is descended from the left-right symmetric $SU(2)_R \times SU(2)_L \times U(1)_{B-L}$ group, the decay modes and rates would change. In our study we merge two leading Beyond Standard Model scenarios, namely compositeness and left-right symmetry, and probe the resulting collider signatures in the leptonic case. If excited leptons were coupled to a left-right symmetric extension of the SM, we observe that the cross section times branching ratio of the photon decay channel is strongly depressed, bringing down the exclusion limit of the mass of excited electrons and muons obtained by existing searches from around 2 TeV to less than 1 TeV. On the other hand, the cross section times branching ratio of the Z decay channel is significantly enhanced and is always greater than that of the photon channel. We thus propose analyzing the Z decay channel in existing collider data in order to search for signature of left-right symmetry as well as excited leptons with masses above 1 TeV.

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