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Triple-leptoquark interactions for tree- and loop-level proton decays

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We study the impact of triple-leptoquark interactions on matter stability for two specific proton decay topologies that arise at the tree- and one-loop level if and when they coexist. We demonstrate that the one-loop level topology is much more relevant than the tree-level one when it comes to the proton decay signatures despite the usual loop-suppression factor. We subsequently present detailed analysis of the triple-leptoquark interaction effects on the proton stability within one representative scenario to support our claim, where the scenario in question simultaneously features a tree-level topology that yields three-body proton decay $p \to e^+e^+e^-$ and a one-loop level topology that induces two-body proton decays $p \to \pi^0 e^+$ and $p \to \pi^+ \nu^-$. We also provide a comprehensive list of the leading-order proton decay channels for all non-trivial cubic and quartic contractions involving three scalar leptoquark multiplets that generate triple-leptoquark interactions of our interest, where in the latter case one of the scalar multiplets is the Standard Model Higgs doublet.

In-person participation

No

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