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Phenomenology of Scalar Leptoquarks: neutrino mass, $g - 2$, and B -anomalies

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We consider two BSM scenarios with scalar leptoquarks (LQ), motivated by neutrino mass, muon $g - 2$, and anomalies in B -decay ratios. A combination of a singlet and a doublet scalar LQ can generate one-loop Majorana neutrino mass, and contribute to the observed muon and electron $g - 2$ values, while satisfying bounds from lepton flavour violating decays. A carefully chosen parameter space in this model carries discovery and discernability potential at the LHC/FCC from pair production, with different finalstates. On the other hand, extending the SM with a singlet and a triplet scalar LQ separately can categorically explain the observed tensions in B -decay ratios. With a minimal set of couplings, the singlet contributes to $R(D)/R(D^*)$, and the triplet to $R(K)/R(K^*)$. The Yukawa couplings can be probed from single production of the LQs at the LHC/FCC, and their 5σ reach for a range of mass is studied.

Session

Beyond the Standard Model

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