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The Triplet vector boson model: flavor and collider constraints.

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The triplet vector boson (TVB) is a simplified new physics model involving massive vector bosons transforming as a weak triplet vector, which it has been proposed as a combined explanation for the anomalous $b \rightarrow s\mu^+\mu^-$ and $b \rightarrow c\tau\nu^-\tau$ data (the so-called B-meson anomalies). In this work, we carry out an updated view of the TVB model, including the Belle II perspectives. We perform a global fit to explore the allowed parameter space by the most current $b \rightarrow s\mu^+\mu^-$ and $b \rightarrow c\tau\nu^-\tau$ data by considering all relevant low-energy flavor observables. Our results are confronted with the most recent LHC constraints. We also incorporate in our study the first measurement of the ratio $R(\Lambda_c) = BR(\Lambda_b \rightarrow \Lambda c \tau \nu^-\tau) / BR(\Lambda_b \rightarrow \Lambda c \mu \nu^-\mu)$ very recently obtained by LHCb. In particular, we show that the TVB model can provide an explanation for the B meson anomalies; however, this framework is in strong tension with LHC bounds. With respect to future flavor measurements at Belle II, our results suggest that a small new physics window would be allowed to explain the $b \rightarrow c\tau\nu^-\tau$ data in agreement with LHC constraints solely. Furthermore, the implications of our phenomenological analysis of the TVB model to some known flavor parametrizations are also discussed.

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