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Search for Leptoquarks Coupled to Third-Generation Quarks in Proton - Proton Collisions at $\sqrt{s} = 13$ TeV (Article) (Open Access)

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Abstract ▾ View references (101)

Three of the most significant measured deviations from standard model predictions, the enhanced decay rate for $B \rightarrow D^{(*)} \tau \nu$, hints of lepton universality violation in $B \rightarrow K^{(*)} \tau \nu$ decays, and the anomalous magnetic moment of the muon, can be explained by the existence of leptoquarks (LQs) with large couplings to third-generation quarks and masses at the TeV scale. The existence of these states can be probed at the LHC in high energy proton - proton collisions. A novel search is presented for pair production of LQs coupled to a top quark and a muon using data at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb⁻¹, recorded by the CMS experiment. No deviation from the standard model prediction has been observed and scalar LQs decaying exclusively into $t\mu$ are excluded up to masses of 1420 GeV. The results of this search are combined with those from previous searches for LQ decays into $t\tau$ and $b\nu$, which excluded scalar LQs below masses of 900 and 1080 GeV. Vector LQs are excluded up to masses of 1190 GeV for all possible combinations of branching fractions to $t\mu$, $t\tau$ and $b\nu$. With this analysis, all relevant couplings of LQs with an electric charge of $-1/3$ to third-generation quarks are probed for the first time. © 2018 CERN for the CMS Collaboration. Published by the American Physical Society under the terms of the »https://creativecommons.org/licenses/by/4.0/« Creative Commons Attribution 4.0 International license. Further distribution of this work must maintain attribution to the author(s) and the published article's title, journal citation, and DOI. Funded by SCOAP³.

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