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Volume 2018, Issue 7, 1 July 2018, Article number 115Search for a singly produced third-generation scalar leptoquark decaying to a τ lepton and a bottom quark in proton - proton collisions at $\sqrt{s} = 13$ TeV (Article) [\(Open Access\)](#)Sirunyan, A.M.^a, Tumasyan, A.^a, Adam, W.^b, Ambrogi, F.^b, Asilar, E.^b, Bergauer, T.^b, Brandstetter, J.^b, Dragicevic, M.^b, Erö, J.^b, Escalante Del Valle, A.^b, Flechl, M.^b, Frühwirth, R.^{b,gu}, Ghete, V.M.^b, Hrubec, J.^b, Jeitler, M.^{b,gu}, Krammer, N.^b, Krätschmer, I.^b, Liko, D.^b, Mädlener, T.^b, Mikulec, I.^b, Rad, N.^b[View additional authors](#) ^aYerevan Physics Institute, Yerevan, Armenia^bInstitut für Hochenergiephysik, Wien, Austria^cInstitute for Nuclear Problems, Minsk, Belarus[View additional affiliations](#)

Abstract

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A search is presented for a singly produced third-generation scalar leptoquark decaying to a τ lepton and a bottom quark. Associated production of a leptoquark and a τ lepton is considered, leading to a final state with a bottom quark and two τ leptons. The search uses proton - proton collision data at a center-of-mass energy of 13 TeV recorded with the CMS detector, corresponding to an integrated luminosity of 35.9 fb⁻¹. Upper limits are set at 95% confidence level on the production cross section of the third-generation scalar leptoquarks as a function of their mass. From a comparison of the results with the theoretical predictions, a third-generation scalar leptoquark decaying to a τ lepton and a bottom quark, assuming unit Yukawa coupling (λ), is excluded for masses below 740 GeV. Limits are also set on λ of the hypothesized leptoquark as a function of its mass. Above $\lambda = 1.4$, this result provides the best upper limit on the mass of a third-generation scalar leptoquark decaying to a τ lepton and a bottom quark. [Figure not available: see fulltext.] © 2018, The Author(s).

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