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Search for heavy neutrinos and third-generation leptoquarks in hadronic states of two τ leptons and two jets in proton - proton collisions at √ s = 13 TeV (Article) (Open Access)

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Abstract

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A search for new particles has been conducted using events with two high transverse momentum τ leptons that decay hadronically and at least two energetic jets. The analysis is performed using data from proton - proton collisions at s = 13 TeV, collected by the CMS experiment at the LHC in 2016 and corresponding to an integrated luminosity of 35.9 fb $^{-1}$. The observed data are consistent with standard model expectations. The results are interpreted in the context of two physics models. The first model involves right-handed charged bosons, W_R, that decay to heavy right-handed Majorana neutrinos, N_ℓ (ℓ = e, μ, τ), arising in a left-right symmetric extension of the standard model. The model considers that N_e and N_μ are too heavy to be detected at the LHC. Assuming that the N_τ mass is half of the W_R mass, masses of the W_R boson below 3.50 TeV are excluded at 95% confidence level. Exclusion limits are also presented considering different scenarios for the mass ratio between N_τ and W_R, as a function of W_R mass. In the second model, pair production of third-generation scalar leptoquarks that decay into τ τ bb is considered, resulting in an observed exclusion region with leptoquark masses below 1.02 TeV, assuming a 100% branching fraction for the leptoquark decay to a τ lepton and a bottom quark. These results represent the most stringent limits to date on these models.[Figure not available: see fulltext.].

SciVal Topic Prominence

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References (86)

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View all 86 references

1 Patrignani, C., Agashe, K., Aielli, G., Amsler, C., Antonelli, M., Asner, D.M., Baer, H., (...), Schaffner, P.

Review of particle physics

(2016) *Chinese Physics C*, 40 (10), art. no. 100001. Cited 3394 times.
http://iopscience.iop.org/article/10.1088/1674-1137/40/10/100001/pdf
doi: 10.1088/1674-1137/40/10/100001

View at Publisher

2 Lindner, M., Ohlsson, T., Seidl, G.

Seesaw mechanisms for Dirac and Majorana neutrino masses

(2002) *Physical Review D - Particles, Fields, Gravitation and Cosmology*, 65 (5), art. no. 053014, pp. 530141-5301411. Cited 16 times.

View at Publisher

3 Minkowski, P.

μ→eγ at a rate of one out of 109 muon decays?

(1977) *Physics Letters B*, 67 (4), pp. 421-428. Cited 2751 times.
doi: 10.1016/0370-2693(77)90435-X

View at Publisher