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## Search for heavy Majorana neutrinos in same-sign dilepton channels in proton-proton collisions at root s = TeV

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JOURNAL OF HIGH ENERGY PHYSICS

Issue: 1

Article Number: 122

DOI: 10.1007/JHEP01(2019)122

Published: JAN 15 2019

Document Type: Article

[View Journal Impact](#)

### Abstract

A search is performed for a heavy Majorana neutrino (N), produced in leptonic decay of a W boson propagator and decaying into a W boson and a lepton, with the CMS detector at the LHC. The signature used in this search consists of two same-sign leptons, in any flavor combination of electrons and muons, and at least one jet. The data were collected during 2016 in proton-proton collisions at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. The results are found to be consistent with the expected standard model background. Upper limits are set in the mass range between 20 and 1600 GeV in the context of a Type-I seesaw mechanism, on  $|V_{eN}|^2$ ,  $|V_{\mu N}|^2$ , and  $|V_{eN}|^2/(|V_{eN}|^2+|V_{\mu N}|^2)$ , where V-N is the matrix element describing the mixing of N with the standard model neutrino of flavor = e, . For N masses between 20 and 1600 GeV, the upper limits on  $|V_{eN}|^2$  range between  $2.3 \times 10^{-5}$  and unity. These are the most restrictive direct limits for heavy Majorana neutrino masses above 430 GeV.

### Keywords

Author Keywords: [Beyond Standard Model](#); [Hadron-Hadron scattering \(experiments\)](#)

KeyWords Plus: [LEPTON NUMBER VIOLATION](#); [DOUBLE-BETA-DECAY](#); [DARK-MATTER](#); [MASSES](#); [NONCONSERVATION](#); [MODELS](#); [VMSM](#)

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Times Cited: 31

2. [Observation of  \$B \rightarrow J/\psi f\_1\(1285\)\$  Decays and Measurement of the  \$f\_1\(1285\)\$  Mixing Angle](#) Times Cited: 26  
By: Aaij, R.; Adeva, B.; Adinolfi, M.; et al.  
Group Author(s): LHCb Collaborat  
PHYSICAL REVIEW LETTERS Volume: 112 Issue: 9 Article Number: 091802 Published: MAR 4 2014
3. [Search for neutral heavy leptons produced in Z decays \(vol 74, pg 57, 1997\)](#) Times Cited: 69  
By: Abreu, P  
ZEITSCHRIFT FUR PHYSIK C-PARTICLES AND FIELDS Volume: 75 Issue: 3 Pages: 580-580 Published: JUL 1997
4. [Search for neutral heavy leptons produced in Z decays](#) Times Cited: 116  
By: Abreu, P; Adam, W; Abye, T; et al.  
ZEITSCHRIFT FUR PHYSIK C-PARTICLES AND FIELDS Volume: 74 Issue: 1 Pages: 57-71 Published: MAR 1997
5. [Search for heavy isosinglet neutrino in  \$e^+e^-\$  annihilation at LEP](#) Times Cited: 49  
By: Achard, P; Adriani, O; Aguilar-Benitez, M; et al.  
Group Author(s): L3 Collaboration  
PHYSICS LETTERS B Volume: 517 Issue: 1-2 Pages: 67-74 Published: SEP 27 2001
6. [SEARCH FOR ISOSINGLET NEUTRAL HEAVY-LEPTONS IN Z0 DECAYS](#) Times Cited: 91  
By: ADRIANI, O; AGUILARBENITEZ, M; AHLEN, S; et al.  
PHYSICS LETTERS B Volume: 295 Issue: 3-4 Pages: 371-382 Published: DEC 3 1992
7. [GEANT4-a simulation toolkit](#) Times Cited: 10,564  
By: Agostinelli, S; Allison, J; Amako, K; et al.  
NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 506 Issue: 3 Pages: 250-303 Published: JUL 1 2003
8. [Neutrino oscillations: quantum mechanics vs. quantum field theory \(vol 04, 008, 2010\)](#) Times Cited: 8  
By: Akhmedov, Evgeny Kh.; Kopp, Joachim  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 10 Article Number: 052 Published: OCT 9 2013
9. [A general framework for implementing NLO calculations in shower Monte Carlo programs: the POWHEG BOX](#) Times Cited: 901  
By: Alioli, Simone; Nason, Paolo; Oleari, Carlo; et al.  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 6 Article Number: 043 Published: JUN 2010
10. [Signature for heavy Majorana neutrinos in hadronic collisions](#) Times Cited: 88  
By: Almeida, FML; Coutinho, YA; Simoes, JAM; et al.  
PHYSICAL REVIEW D Volume: 62 Issue: 7 Article Number: 075004 Published: OCT 1 2000
11. [Heavy Majorana neutrinos from W gamma fusion at hadron colliders](#) Times Cited: 51  
By: Alva, Daniel; Han, Tao; Ruiz, Richard  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 2 Article Number: 072 Published: FEB 11 2015
12. [Comparative study of various algorithms for the merging of parton showers and matrix elements in hadronic collisions](#) Times Cited: 448  
By: Alwall, J.; Hoche, S.; Krauss, F.; et al.  
EUROPEAN PHYSICAL JOURNAL C Volume: 53 Issue: 3 Pages: 473-500 Published: FEB 2008
13. [The automated computation of tree-level and next-to-leading order differential cross sections, and their matching to parton shower simulations](#) Times Cited: 1,999  
By: Alwall, J.; Frederix, R.; Frixione, S.; et al.  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 7 Article Number: 079 Published: JUL 17 2014
14. [Dynamical symmetry breaking of extended gauge symmetries](#) Times Cited: 93  
By: Appelquist, T; Shrock, R  
PHYSICAL REVIEW LETTERS Volume: 90 Issue: 20 Article Number: 201801 Published: MAY 23 2003
15. [Neutrino masses in theories with dynamical electroweak symmetry breaking](#) Times Cited: 104  
By: Appelquist, T; Shrock, R

16. **A framework for Higgs characterisation** Times Cited: 92  
By: Artoisenet, P.; de Aquino, P.; Demartin, F.; et al.  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 11 Article Number: 043 Published: NOV 6 2013
  
17. **The vMSM, dark matter and neutrino masses** Times Cited: 390  
By: Asaka, T; Blanchet, S; Shaposhnikov, M  
PHYSICS LETTERS B Volume: 631 Issue: 4 Pages: 151-156 Published: DEC 29 2005
  
18. **The vMSM, dark matter and baryon asymmetry of the universe** Times Cited: 405  
By: Asaka, T; Shaposhnikov, M  
PHYSICS LETTERS B Volume: 620 Issue: 1-2 Pages: 17-26 Published: JUL 28 2005
  
19. **The search for heavy Majorana neutrinos** Times Cited: 294  
By: Atre, Anupama; Han, Tao; Pascoli, Silvia; et al.  
JOURNAL OF HIGH ENERGY PHYSICS Issue: 5 Article Number: 030 Published: MAY 2009
  
20. **Massive gauge boson pair production at the LHC: a next-to-leading order story** Times Cited: 1  
By: Baglio, J.; Ninh, L. D.; Weber, M. M.  
Phys. Rev. Volume: D 94 Article Number: 099902 Published: 2016
  
21. **Massive gauge boson pair production at the LHC: A next-to-leading order story** Times Cited: 61  
By: Baglio, Julien; Le Duc Ninh; Weber, Marcus M.  
PHYSICAL REVIEW D Volume: 88 Issue: 11 Article Number: 113005 Published: DEC 5 2013
  
22. **LEPTON FLAVOR NONCONSERVATION AT HIGH-ENERGIES IN A SUPERSTRING INSPIRED STANDARD MODEL** Times Cited: 226  
By: BERNABEU, J; SANTAMARIA, A; VIDAL, J; et al.  
PHYSICS LETTERS B Volume: 187 Issue: 3-4 Pages: 303-308 Published: MAR 26 1987
  
23. **Vector-boson pair production at the LHC to  $O(\alpha_s^3)$  accuracy** Times Cited: 48  
By: Bierweiler, A.; Kasprzik, T.; Kuhn, J.H.  
JHEP Volume: 12 Pages: 71 Published: 2013  
arXiv:1305.5402
  
24. **PDF4LHC recommendations for LHC Run II** Times Cited: 285  
By: Butterworth, Jon; Carrazza, Stefano; Cooper-Sarkar, Amanda; et al.  
JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS Volume: 43 Issue: 2 Article Number: 023001 Published: FEB 2016
  
25. Title: [not available] Times Cited: 368  
By: CACCIARI M  
J HIGH ENERGY PHYS Published: 2008
  
26. **FastJet user manual** Times Cited: 1,641  
By: Cacciari, Matteo; Salam, Gavin P.; Soyez, Gregory  
EUROPEAN PHYSICAL JOURNAL C Volume: 72 Issue: 3 Article Number: 1896 Published: MAR 2012
  
27. **Lepton Number Violation: Seesaw Models and Their Collider Tests** Times Cited: 22  
By: Cai, Yi; Han, Tao; Li, Tong; et al.  
FRONTIERS IN PHYSICS Volume: 6 Article Number: 40 Published: MAY 9 2018
  
28. **MCFM for the Tevatron and the LHC** Times Cited: 369  
By: Campbell, John M.; Ellis, R. K.  
NUCLEAR PHYSICS B-PROCEEDINGS SUPPLEMENTS Volume: 205-06 Pages: 10-15 Published: AUG-SEP 2010
  
29. **Performance of CMS muon reconstruction in pp collision events at root s=7TeV** Times Cited: 361  
By: Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; et al.  
Group Author(s): CMS Collaboration  
JOURNAL OF INSTRUMENTATION Volume: 7 Article Number: P10002 Published: OCT 2012

30. [The CMS experiment at the CERN LHC](#)

Times Cited: **1,755**

By: Chatrchyan, S.; Hmayakyan, G.; Khachatryan, V.; et al.

Group Author(s): CMS Collaboration

JOURNAL OF INSTRUMENTATION Volume: 3 Article Number: S08004 Published: AUG 2008

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