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Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics Open Access
Volume 800, 10 January 2020, Article number 135087

Search for light pseudoscalar boson pairs produced from decays of the 125 GeV Higgs boson in final states with two muons and two nearby tracks in pp collisions at s=13TeV

(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,gy], Ghete, V.M.[b], Hrubec, J.[b], Jeitler, M.[b,gy], Krammer, N.[b], Krätschmer, I.[b], Liko, D.[b], Madlener, T.[b], Mikulec, I.[b], Rad, N.[b],

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Abstract

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A search is presented for pairs of light pseudoscalar bosons, in the mass range from 4 to 15 GeV, produced from decays of the 125 GeV Higgs boson. The decay modes considered are final states that arise when one of the pseudoscalars decays to a pair of tau leptons, and the other one either into a pair of tau leptons or muons. The search is based on proton-proton collisions collected by the CMS experiment in 2016 at a center-of-mass energy of 13 TeV that correspond to an integrated luminosity of 35.9 fb^{-1}. The 2μ2τ and 4τ channels are used in combination to constrain the product of the Higgs boson production cross section and the branching fraction into 4τ final state, σB, exploiting the linear dependence of the fermionic coupling strength of pseudoscalar bosons on the fermion mass. No significant excess is observed beyond the expectation from the standard model. The observed and expected upper limits at 95% confidence level on σB, relative to the standard model Higgs boson production cross section, are set respectively between 0.022 and 0.23 and between 0.027 and 0.19 in the mass range probed by the analysis. © 2019 The Author(s)

SciVal Topic Prominence

Topic: Top Quark | Partons | Higgs Bosons

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Author keywords

2HD+1S CMS Higgs boson NMSSM Physics

Funding details

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Funding text #1

We congratulate our colleagues in the CERN accelerator departments for the excellent performance of the LHC and thank the technical and administrative staffs at CERN and at other CMS institutes for their contributions to the success of the CMS effort. In addition, we gratefully acknowledge the computing centers and personnel of the Worldwide LHC Computing Grid for delivering so effectively the computing infrastructure essential to our analyses. Finally, we acknowledge the enduring support for the construction and operation of the LHC and the CMS detector provided by the following funding agencies: BMBWF and FWF (Austria); FNRS and FWO (Belgium); CNPq , CAPES , FAPERJ , FAPERGS , and FAPESP (Brazil); MES (Bulgaria); CERN ; CAS , MOST , and NSFC (China); COLCIENCIAS (Colombia); MSES and CSF (Croatia); RPF (Cyprus); SENESCYT (Ecuador); MoER , ERC IUT , PUT and ERDF (Estonia); Academy of Finland , MEC , and HIP (Finland); CEA and CNRS/IN2P3 (France); BMBF , DFG , and HGF (Germany); GSRT (G... View all

Funding text #2
Individuals have received support from the Marie-Curie program and the European Research Council and Horizon 2020 Grant, contract Nos. 675440 , 752730 , and 765710 (European Union); the Leventis Foundation ; the A.P. Sloan Foundation ; the Alexander von Humboldt Foundation ; the Belgian Federal Science Policy Office ; the Fonds pour la Formation à la Recherche dans l'Industrie et dans l'Agriculture (FRIA-Belgium); the Agentschap voor Innovatie door Wetenschap en Technologie (IWT-Belgium); the F.R.S.-FNRS and FWO (Belgium) under the “Excellence of Science – EOS” – be.h project n. 30820817 ; the Beijing Municipal Science & Technology Commission , No. Z181100004218003 ; the Ministry of Education, Youth and Sports (MEYS) of the Czech Republic; the Lendület (“Momentum”) Program and the János Bolyai Research Scholarship of the Hungarian Academy of Sciences , the New National Excellence Program ÚNKP, the NKFIA research grants 123842 , 123959 , 124845 , 124850 , 125105 , 128713 , 128786 , ... View all

ISSN: 03702693
CODEN: PYLBA
Source Type: Journal
Original language: English
DOI: 10.1016/j.physletb.2019.135087
Document Type: Article
Publisher: Elsevier B.V.

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