

# Search for additional heavy neutral Higgs and gauge bosons in the ditau final state produced in $36 \text{ fb}^{-1}$ of $pp$ collisions at $\sqrt{s} = 13 \text{ TeV}$ with the ATLAS detector

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- The ATLAS collaboration (41) (166) (179) (267) Email author (atlas.publications@cern.ch)
- M. Aaboud (181)
- G. Aad (116)
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1. Department of Physics, University of Adelaide, Adelaide, Australia
2. Physics Department, SUNY Albany, Albany, United States of America
3. Department of Physics, University of Alberta, Edmonton, Canada
4. Department of Physics, Ankara University, Ankara, Turkey
5. Istanbul Aydin University, Istanbul, Turkey
6. Division of Physics, TOBB University of Economics and Technology, Ankara, Turkey
7. LAPP, CNRS/IN2P3 and Université Savoie Mont Blanc, Annecy-le-Vieux, France
8. High Energy Physics Division, Argonne National Laboratory, Argonne, United States of America
9. Department of Physics, University of Arizona, Tucson, United States of America
10. Department of Physics, The University of Texas at Arlington, Arlington, United States of America
11. Physics Department, National and Kapodistrian University of Athens, Athens, Greece
12. Physics Department, National Technical University of Athens, Zografou, Greece
13. Department of Physics, The University of Texas at Austin, Austin, United States of America
14. Institute of Physics, Azerbaijan Academy of Sciences, Baku, Azerbaijan
15. Institut de Física d'Altes Energies (IFAE), The Barcelona Institute of Science and Technology, Barcelona, Spain
16. Institute of Physics, University of Belgrade, Belgrade, Serbia
17. Department for Physics and Technology, University of Bergen, Bergen, Norway
18. Physics Division, Lawrence Berkeley National Laboratory and University of California, Berkeley, United States of America
19. Department of Physics, Humboldt University, Berlin, Germany
20. Albert Einstein Center for Fundamental Physics and Laboratory for High Energy Physics, University of Bern, Bern, Switzerland
21. School of Physics and Astronomy, University of Birmingham, Birmingham, United Kingdom
22. Department of Physics, Bogazici University, Istanbul, Turkey
23. Department of Physics Engineering, Gaziantep University, Gaziantep, Turkey
24. Istanbul Bilgi University, Faculty of Engineering and Natural Sciences, Istanbul, Turkey
25. Bahcesehir University, Faculty of Engineering and Natural Sciences, Istanbul, Turkey
26. Centro de Investigaciones, Universidad Antonio Narino, Bogota, Colombia
27. INFN Sezione di Bologna, Bologna, Italy
28. Dipartimento di Fisica e Astronomia, Università di Bologna, Bologna, Italy
29. Physikalisches Institut, University of Bonn, Bonn, Germany
30. Department of Physics, Boston University, Boston, United States of America
31. Department of Physics, Brandeis University, Waltham, United States of America

32. Universidade Federal do Rio De Janeiro COPPE/EE/IF, Rio de Janeiro, Brazil
33. Electrical Circuits Department, Federal University of Juiz de Fora (UFJF), Juiz de Fora, Brazil
34. Federal University of Sao Joao del Rei (UFSJ), Sao Joao del Rei, Brazil
35. Instituto de Fisica, Universidade de Sao Paulo, Sao Paulo, Brazil
36. Physics Department, Brookhaven National Laboratory, Upton, United States of America
37. Transilvania University of Brasov, Brasov, Romania
38. Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest, Romania
39. Department of Physics, Alexandru Ioan Cuza University of Iasi, Iasi, Romania
40. National Institute for Research and Development of Isotopic and Molecular Technologies, Physics Department, Cluj Napoca, Romania
41. University Politehnica Bucharest, Bucharest, Romania
42. West University in Timisoara, Timisoara, Romania
43. Departamento de Física, Universidad de Buenos Aires, Buenos Aires, Argentina
44. Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom
45. Department of Physics, Carleton University, Ottawa, Canada
46. CERN, Geneva, Switzerland
47. Enrico Fermi Institute, University of Chicago, Chicago, United States of America
48. Departamento de Física, Pontificia Universidad Católica de Chile, Santiago, Chile
49. Departamento de Física, Universidad Técnica Federico Santa María, Valparaíso, Chile
50. Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, China
51. Department of Physics, Nanjing University, Jiangsu, China
52. Physics Department, Tsinghua University, Beijing, China
53. University of Chinese Academy of Science (UCAS), Beijing, China
54. Department of Modern Physics and State Key Laboratory of Particle Detection and Electronics, University of Science and Technology of China, Anhui, China
55. School of Physics, Shandong University, Shandong, China
56. Department of Physics and Astronomy, Key Laboratory for Particle Physics, Astrophysics and Cosmology, Ministry of Education; Shanghai Key Laboratory for Particle Physics and Cosmology, Shanghai Jiao Tong University, Tsung-Dao Lee Institute, Shanghai Shi, China
57. Université Clermont Auvergne, CNRS/IN2P3, LPC, Clermont-Ferrand, France
58. Nevis Laboratory, Columbia University, Irvington, United States of America
59. Niels Bohr Institute, University of Copenhagen, Kobenhavn, Denmark
60. INFN Gruppo Collegato di Cosenza, Laboratori Nazionali di Frascati, Rende, Italy
61. Dipartimento di Fisica, Università della Calabria, Rende, Italy
62. AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Krakow, Poland
63. Marian Smoluchowski Institute of Physics, Jagiellonian University, Krakow, Poland
64. Institute of Nuclear Physics Polish Academy of Sciences, Krakow, Poland
65. Physics Department, Southern Methodist University, Dallas, United States of America
66. Physics Department, University of Texas at Dallas, Richardson, United States of America
67. DESY, Hamburg and Zeuthen, Germany
68. Lehrstuhl für Experimentelle Physik IV, Technische Universität Dortmund,



- Dortmund, Germany
69. Institut für Kern- und Teilchenphysik, Technische Universität Dresden, Dresden, Germany
  70. Department of Physics, Duke University, Durham, United States of America
  71. SUPA - School of Physics and Astronomy, University of Edinburgh, Edinburgh, United Kingdom
  72. INFN e Laboratori Nazionali di Frascati, Frascati, Italy
  73. Fakultät für Mathematik und Physik, Albert-Ludwigs-Universität, Freiburg, Germany
  74. Departement de Physique Nucleaire et Corpusculaire, Université de Genève, Geneva, Switzerland
  75. INFN Sezione di Genova, Genova, Italy
  76. Dipartimento di Fisica, Università di Genova, Genova, Italy
  77. E. Andronikashvili Institute of Physics, Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
  78. High Energy Physics Institute, Tbilisi State University, Tbilisi, Georgia
  79. II Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen, Germany
  80. SUPA - School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom
  81. II Physikalisches Institut, Georg-August-Universität, Göttingen, Germany
  82. Laboratoire de Physique Subatomique et de Cosmologie, Université Grenoble-Alpes, CNRS/IN2P3, Grenoble, France
  83. Laboratory for Particle Physics and Cosmology, Harvard University, Cambridge, United States of America
  84. Kirchhoff-Institut für Physik, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany
  85. Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany
  86. Faculty of Applied Information Science, Hiroshima Institute of Technology, Hiroshima, Japan
  87. Department of Physics, The Chinese University of Hong Kong, Hong Kong, China
  88. Department of Physics, The University of Hong Kong, Hong Kong, China
  89. Department of Physics and Institute for Advanced Study, The Hong Kong University of Science and Technology, Hong Kong, China
  90. Department of Physics, National Tsing Hua University, Taiwan, Taiwan
  91. Department of Physics, Indiana University, Bloomington, United States of America
  92. Institut für Astro- und Teilchenphysik, Leopold-Franzens-Universität, Innsbruck, Austria
  93. University of Iowa, Iowa City, United States of America
  94. Department of Physics and Astronomy, Iowa State University, Ames, United States of America
  95. Joint Institute for Nuclear Research, JINR Dubna, Dubna, Russia
  96. KEK, High Energy Accelerator Research Organization, Tsukuba, Japan
  97. Graduate School of Science, Kobe University, Kobe, Japan
  98. Faculty of Science, Kyoto University, Kyoto, Japan
  99. Kyoto University of Education, Kyoto, Japan
  100. Research Center for Advanced Particle Physics and Department of Physics, Kyushu University, Fukuoka, Japan
  101. Instituto de Física La Plata, Universidad Nacional de La Plata and CONICET, La Plata, Argentina
  102. Physics Department, Lancaster University, Lancaster, United Kingdom

103. INFN Sezione di Lecce, Lecce, Italy
104. Dipartimento di Matematica e Fisica, Università del Salento, Lecce, Italy
105. Oliver Lodge Laboratory, University of Liverpool, Liverpool, United Kingdom
106. Department of Experimental Particle Physics, Jožef Stefan Institute and Department of Physics, University of Ljubljana, Ljubljana, Slovenia
107. School of Physics and Astronomy, Queen Mary University of London, London, United Kingdom
108. Department of Physics, Royal Holloway University of London, Surrey, United Kingdom
109. Department of Physics and Astronomy, University College London, London, United Kingdom
110. Louisiana Tech University, Ruston, United States of America
111. Laboratoire de Physique Nucléaire et de Hautes Energies, UPMC and Université Paris-Diderot and CNRS/IN2P3, Paris, France
112. Fysiska institutionen, Lunds universitet, Lund, Sweden
113. Departamento de Física Teórica C-15, Universidad Autónoma de Madrid, Madrid, Spain
114. Institut für Physik, Universität Mainz, Mainz, Germany
115. School of Physics and Astronomy, University of Manchester, Manchester, United Kingdom
116. CPPM, Aix-Marseille Université and CNRS/IN2P3, Marseille, France
117. Department of Physics, University of Massachusetts, Amherst, United States of America
118. Department of Physics, McGill University, Montreal, Canada
119. School of Physics, University of Melbourne, Victoria, Australia
120. Department of Physics, The University of Michigan, Ann Arbor, United States of America
121. Department of Physics and Astronomy, Michigan State University, East Lansing, United States of America
122. INFN Sezione di Milano, Milano, Italy
123. Dipartimento di Fisica, Università di Milano, Milano, Italy
124. B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk, Republic of Belarus
125. Research Institute for Nuclear Problems of Byelorussian State University, Minsk, Republic of Belarus
126. Group of Particle Physics, University of Montreal, Montreal, Canada
127. P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia
128. Institute for Theoretical and Experimental Physics (ITEP), Moscow, Russia
129. National Research Nuclear University MEPhI, Moscow, Russia
130. D.V. Skobeltsyn Institute of Nuclear Physics, M.V. Lomonosov Moscow State University, Moscow, Russia
131. Fakultät für Physik, Ludwig-Maximilians-Universität München, München, Germany
132. Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), München, Germany
133. Nagasaki Institute of Applied Science, Nagasaki, Japan
134. Graduate School of Science and Kobayashi-Maskawa Institute, Nagoya University, Nagoya, Japan
135. INFN Sezione di Napoli, Napoli, Italy
136. Dipartimento di Fisica, Università di Napoli, Napoli, Italy
137. Department of Physics and Astronomy, University of New Mexico, Albuquerque, United States of America
138. Institute for Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen (Nikhef-Nijmegen), Nijmegen, The Netherlands

- University Nijmegen/Nikhef, Nijmegen, Netherlands
139. Nikhef National Institute for Subatomic Physics and University of Amsterdam, Amsterdam, Netherlands
140. Department of Physics, Northern Illinois University, DeKalb, United States of America
141. Budker Institute of Nuclear Physics, SB RAS, Novosibirsk, Russia
142. Department of Physics, New York University, New York, United States of America
143. Ohio State University, Columbus, United States of America
144. Faculty of Science, Okayama University, Okayama, Japan
145. Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, Norman, United States of America
146. Department of Physics, Oklahoma State University, Stillwater, United States of America
147. Palacký University, RCPTM, Olomouc, Czech Republic
148. Center for High Energy Physics, University of Oregon, Eugene, United States of America
149. LAL, Univ. Paris-Sud, CNRS/IN2P3, Université Paris-Saclay, Orsay, France
150. Graduate School of Science, Osaka University, Osaka, Japan
151. Department of Physics, University of Oslo, Oslo, Norway
152. Department of Physics, Oxford University, Oxford, United Kingdom
153. INFN Sezione di Pavia, Pavia, Italy
154. Dipartimento di Fisica, Università di Pavia, Pavia, Italy
155. Department of Physics, University of Pennsylvania, Philadelphia, United States of America
156. National Research Centre “Kurchatov Institute” B.P.Konstantinov Petersburg Nuclear Physics Institute, St. Petersburg, Russia
157. INFN Sezione di Pisa, Pisa, Italy
158. Dipartimento di Fisica E. Fermi, Università di Pisa, Pisa, Italy
159. Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, United States of America
160. Laboratório de Instrumentação e Física Experimental de Partículas - LIP, Lisboa, Portugal
161. Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal
162. Department of Physics, University of Coimbra, Coimbra, Portugal
163. Centro de Física Nuclear da Universidade de Lisboa, Lisboa, Portugal
164. Departamento de Física, Universidade do Minho, Braga, Portugal
165. Departamento de Física Teórica y del Cosmos, Universidad de Granada, Granada, Portugal
166. Dep Física and CEFITEC of Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Caparica, Portugal
167. Institute of Physics, Academy of Sciences of the Czech Republic, Praha, Czech Republic
168. Czech Technical University in Prague, Praha, Czech Republic
169. Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic
170. State Research Center Institute for High Energy Physics (Protvino), NRC KI, Protvino, Russia
171. Particle Physics Department, Rutherford Appleton Laboratory, Didcot, United Kingdom
172. INFN Sezione di Roma, Roma, Italy
173. Dipartimento di Fisica, Sapienza Università di Roma, Roma, Italy
174. INFN Sezione di Roma Tor Vergata, Roma, Italy
175. Dipartimento di Fisica, Università di Roma Tor Vergata, Roma, Italy

176. INFN Sezione di Roma Tre, Roma, Italy
177. Dipartimento di Matematica e Fisica, Università Roma Tre, Roma, Italy
178. Faculté des Sciences Ain Chock, Réseau Universitaire de Physique des Hautes Energies - Université Hassan II, Casablanca, Morocco
179. Centre National de l'Energie des Sciences Techniques Nucleaires, Rabat, Morocco
180. Faculté des Sciences Semlalia, Université Cadi Ayyad, LPHEA-Marrakech, Marrakech, Morocco
181. Faculté des Sciences, Université Mohamed Premier and LPTPM, Oujda, Morocco
182. Faculté des sciences, Université Mohammed V, Rabat, Morocco
183. DSM/IRFU (Institut de Recherches sur les Lois Fondamentales de l'Univers), CEA Saclay (Commissariat à l'Energie Atomique et aux Energies Alternatives), Gif-sur-Yvette, France
184. Santa Cruz Institute for Particle Physics, University of California Santa Cruz, Santa Cruz, United States of America
185. Department of Physics, University of Washington, Seattle, United States of America
186. Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom
187. Department of Physics, Shinshu University, Nagano, Japan
188. Department Physik, Universität Siegen, Siegen, Germany
189. Department of Physics, Simon Fraser University, Burnaby, Canada
190. SLAC National Accelerator Laboratory, Stanford, United States of America
191. Faculty of Mathematics, Physics & Informatics, Comenius University, Bratislava, Slovak Republic
192. Department of Subnuclear Physics, Institute of Experimental Physics of the Slovak Academy of Sciences, Kosice, Slovak Republic
193. Department of Physics, University of Cape Town, Cape Town, South Africa
194. Department of Physics, University of Johannesburg, Johannesburg, South Africa
195. School of Physics, University of the Witwatersrand, Johannesburg, South Africa
196. Department of Physics, Stockholm University, Stockholm, Sweden
197. The Oskar Klein Centre, Stockholm, Sweden
198. Physics Department, Royal Institute of Technology, Stockholm, Sweden
199. Departments of Physics & Astronomy and Chemistry, Stony Brook University, Stony Brook, United States of America
200. Department of Physics and Astronomy, University of Sussex, Brighton, United Kingdom
201. School of Physics, University of Sydney, Sydney, Australia
202. Institute of Physics, Academia Sinica, Taipei, Taiwan
203. Department of Physics, Technion: Israel Institute of Technology, Haifa, Israel
204. Raymond and Beverly Sackler School of Physics and Astronomy, Tel Aviv University, Tel Aviv, Israel
205. Department of Physics, Aristotle University of Thessaloniki, Thessaloniki, Greece
206. International Center for Elementary Particle Physics and Department of Physics, The University of Tokyo, Tokyo, Japan
207. Graduate School of Science and Technology, Tokyo Metropolitan University, Tokyo, Japan
208. Department of Physics, Tokyo Institute of Technology, Tokyo, Japan
209. Tomsk State University, Tomsk, Russia

210. Department of Physics, University of Toronto, Toronto, Canada
211. INFN-TIFPA, Trento, Italy
212. University of Trento, Trento, Italy
213. TRIUMF, Vancouver, Canada
214. Department of Physics and Astronomy, York University, Toronto, Canada
215. Faculty of Pure and Applied Sciences, and Center for Integrated Research in Fundamental Science and Engineering, University of Tsukuba, Tsukuba, Japan
216. Department of Physics and Astronomy, Tufts University, Medford, United States of America
217. Department of Physics and Astronomy, University of California Irvine, Irvine, United States of America
218. INFN Gruppo Collegato di Udine, Sezione di Trieste, Udine, Italy
219. ICTP, Trieste, Italy
220. Dipartimento di Chimica, Fisica e Ambiente, Università di Udine, Udine, Italy
221. Department of Physics and Astronomy, University of Uppsala, Uppsala, Sweden
222. Department of Physics, University of Illinois, Urbana, United States of America
223. Instituto de Fisica Corpuscular (IFIC), Centro Mixto Universidad de Valencia - CSIC, Valencia, Spain
224. Department of Physics, University of British Columbia, Vancouver, Canada
225. Department of Physics and Astronomy, University of Victoria, Victoria, Canada
226. Department of Physics, University of Warwick, Coventry, United Kingdom
227. Waseda University, Tokyo, Japan
228. Department of Particle Physics, The Weizmann Institute of Science, Rehovot, Israel
229. Department of Physics, University of Wisconsin, Madison, United States of America
230. Fakultät für Physik und Astronomie, Julius-Maximilians-Universität, Würzburg, Germany
231. Fakultät für Mathematik und Naturwissenschaften, Fachgruppe Physik, Bergische Universität Wuppertal, Wuppertal, Germany
232. Department of Physics, Yale University, New Haven, United States of America
233. Yerevan Physics Institute, Yerevan, Armenia
234. Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules (IN2P3), Villeurbanne, France
235. Academia Sinica Grid Computing, Institute of Physics, Academia Sinica, Taipei, Taiwan
236. Department of Physics, King's College London, London, United Kingdom
237. Novosibirsk State University, Novosibirsk, Russia
238. Department of Physics & Astronomy, University of Louisville, Louisville, United States of America
239. Physics Department, An-Najah National University, Nablus, Palestine
240. Department of Physics, California State University, Fresno, United States of America
241. Department of Physics, University of Fribourg, Fribourg, Switzerland
242. Departament de Física de la Universitat Autònoma de Barcelona, Barcelona, Spain
243. Departamento de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Porto, Portugal
244. Tomsk State University, Tomsk, and Moscow Institute of Physics and

Technology State University, Dolgoprudny, Russia

245. The Collaborative Innovation Center of Quantum Matter (CICQM), Beijing, China

246. Universita di Napoli Parthenope, Napoli, Italy

247. Institute of Particle Physics (IPP), Toronto, Canada

248. Department of Physics, St. Petersburg State Polytechnical University, St. Petersburg, Russia

249. Borough of Manhattan Community College, City University of New York, New York City, United States of America

250. Department of Financial and Management Engineering, University of the Aegean, Chios, Greece

251. Centre for High Performance Computing, CSIR Campus, Rosebank, Cape Town, South Africa

252. Institutio Catalana de Recerca i Estudis Avancats, ICREA, Barcelona, Spain

253. Institute of Theoretical Physics, Ilia State University, Tbilisi, Georgia

254. Georgian Technical University (GTU), Tbilisi, Georgia

255. Ochadai Academic Production, Ochanomizu University, Tokyo, Japan

256. Manhattan College, New York, United States of America

257. The City College of New York, New York, United States of America

258. Department of Physics, California State University, Sacramento, United States of America

259. Moscow Institute of Physics and Technology State University, Dolgoprudny, Russia

260. School of Physics, Sun Yat-sen University, Guangzhou, China

261. Institute for Nuclear Research and Nuclear Energy (INRNE) of the Bulgarian Academy of Sciences, Sofia, Bulgaria

262. Faculty of Physics, M.V.Lomonosov Moscow State University, Moscow, Russia

263. Department of Physics, Stanford University, Stanford, United States of America

264. Institute for Particle and Nuclear Physics, Wigner Research Centre for Physics, Budapest, Hungary

265. Giresun University, Faculty of Engineering, Giresun, Turkey

266. University of Malaya, Department of Physics, Kuala Lumpur, Malaysia

267. CERN, Geneva 23, Switzerland

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## Abstract

A search for heavy neutral Higgs bosons and  $Z'$  bosons is performed using a data sample corresponding to an integrated luminosity of  $36.1 \text{ fb}^{-1}$  from proton-proton collisions at  $\sqrt{s} = 13 \text{ TeV}$  recorded by the ATLAS detector at the LHC during 2015 and 2016. The heavy resonance is assumed to decay to  $\tau^+\tau^-$  with at least one tau lepton decaying to final states with hadrons and a neutrino. The search is

performed in the mass range of 0.2-2.25 TeV for Higgs bosons and 0.2-4.0 TeV for  $Z'$  bosons. The data are in good agreement with the background predicted by the Standard Model. The results are interpreted in benchmark scenarios. In the context of the hMSSM scenario, the data exclude  $\tan \beta > 1.0$  for  $m_A = 0.25$  TeV and  $\tan \beta > 42$  for  $m_A = 1.5$  TeV at the 95% confidence level. For the Sequential Standard Model,  $Z_{\text{SSM}}$  with  $m_{Z'} < 2.42$  TeV is excluded at 95% confidence level, while  $Z_{\text{NU}}$  with  $m_{Z'} < 2.25$  TeV is excluded for the non-universal  $G(221)$  model that exhibits enhanced couplings to third-generation fermions.



## Keywords

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