Editorial: Theorists React to the CERN 750 GeV Diphoton Data

Last December, the ATLAS and CMS Collaborations at the Large Hadron Collider reported preliminary data with a small excess of diphoton events at an invariant mass of about 750 GeV [1,2], which, if verified, would require unexpected new elementary particles. The collaborations have recently reanalyzed their data [3,4], and the signal has become slightly stronger. Though the results are extremely intriguing, more data are required to establish if the excess is real, or a statistical fluctuation.

Over 250 theory papers have appeared following the December announcement, and a number of them were submitted to us. We found it appropriate to publish a small sample of them. To maximize the coherence and fairness of our choices, we obtained informal advice from several experts.

Four such Letters appear in this issue [5–8]. Others may follow, but we think that this set gives readers a sense of the kind of new physics that would be required to explain the data, if confirmed.

Robert Garisto
Editor

Published 12 April 2016

DOI: [10.1103/PhysRevLett.116.150001](https://doi.org/10.1103/PhysRevLett.116.150001)

-
- [1] J. Olsen, CMS 13 TeV Results, CERN special seminar 15 December 2015, https://indico.cern.ch/event/442432/contribution/0/attachments/1205563/1756687/CMS_13_TeV_results_public.pdf.
 - [2] M. Kado, Results with the Full 2015 Data Sample from the ATLAS Experiment, CERN special seminar 15 December 2015, <https://indico.cern.ch/event/442432/contribution/1/attachments/1205572/1759985/CERN-Seminar.pdf>.
 - [3] M. Delmastro, Diphoton searches in ATLAS, 51st Rencontres de Moriond EW 2016 <https://indico.in2p3.fr/event/12279/session/12/contribution/163/material/slides/1.pdf>.
 - [4] P. Musella, Search for high mass diphoton resonances at CMS, 51st Rencontres de Moriond EW 2016 <https://indico.in2p3.fr/event/12279/session/12/contribution/218/material/slides/0.pdf>.
 - [5] Y. Nakai, R. Sato, and K. Tobioka, Footprints of New Strong Dynamics via Anomaly and the 750 GeV Diphoton, *Phys. Rev. Lett.* **116**, 151802 (2016).
 - [6] G. Li, Y.-n. Mao, Y.-L. Tang, C. Zhang, Y. Zhou, and S.-h. Zhu, Pseudoscalar Decaying Only via Loops as an Explanation for the 750 GeV Diphoton Excess, *Phys. Rev. Lett.* **116**, 151803 (2016).
 - [7] C. Petersson and R. Torre, 750 GeV Diphoton Excess from the Goldstino Superpartner, *Phys. Rev. Lett.* **116**, 151804 (2016).
 - [8] W. S. Cho, D. Kim, K. Kong, S. H. Lim, K. T. Matchev, J.-C. Park, and M. Park, 750 GeV Diphoton Excess May Not Imply a 750 GeV Resonance, *Phys. Rev. Lett.* **116**, 151805 (2016).