

The Standard Model prevails—so far: CMS experiment publishes first test at new LHC energy of 13 TeV

August 21 2015



A top quark candidate in the CMS detector. Credit: CMS Collaboration



Shortly after the start of Run 2 at the Large Hadron Collider (LHC) at CERN in June 2015, scientists from DESY and their colleagues from the experiments CMS and ATLAS have performed a first important test of the Standard Model of particle physics at the new energy frontier, using data from proton-proton collisions at higher proton beam energies than ever achieved before. They looked at the production rate of a wellknown particle called the top quark to see if it behaves differently at higher collision energies. Their study shows: it doesn't.

Top quarks are the heaviest and among the most puzzling elementary particles. They weigh even more than the Higgs boson discovered in 2012 and might have a special connection to it. To analyse this relation and to test if the top quark is exactly the particle predicted by the current theory, physicists at the LHC perform high-precision measurements of the properties of the top quark. One of the most exciting studies to that respect is to measure the production rate, or <u>cross section</u>, for top quark pairs in the new energy range never explored before because it provides an excellent test of the Standard Model and might give scienists a first glimpse of new physics beyond.

DESY scientists led the effort to measure the top quark pair production cross section at a proton-proton collision energy of 13 TeV. "The results are in good agreement with what we expected. This is a another huge success of the Standard Model," said Alexander Grohsjean from DESY's CMS group. The results are presented and discussed this week at the international high energy physics conference "XXVII International Symposium on Lepton Photon Interaction at High Energies".





Top quark pair production cross section measurements compared to the Standard Model predictions as a function of the center-of-mass energy. The new result of the CMS collaboration at 13 TeV is displayed in red and is in agreement with the theory prediction (green band). Credit: CMS Collaboration

Provided by Deutsches Elektronen-Synchrotron

Citation: The Standard Model prevails—so far: CMS experiment publishes first test at new LHC energy of 13 TeV (2015, August 21) retrieved 27 April 2024 from <u>https://phys.org/news/2015-08-standard-prevailsso-cms-publishes-lhc.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private



study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.