ATLAS releases first result using full LHC Run 2 dataset

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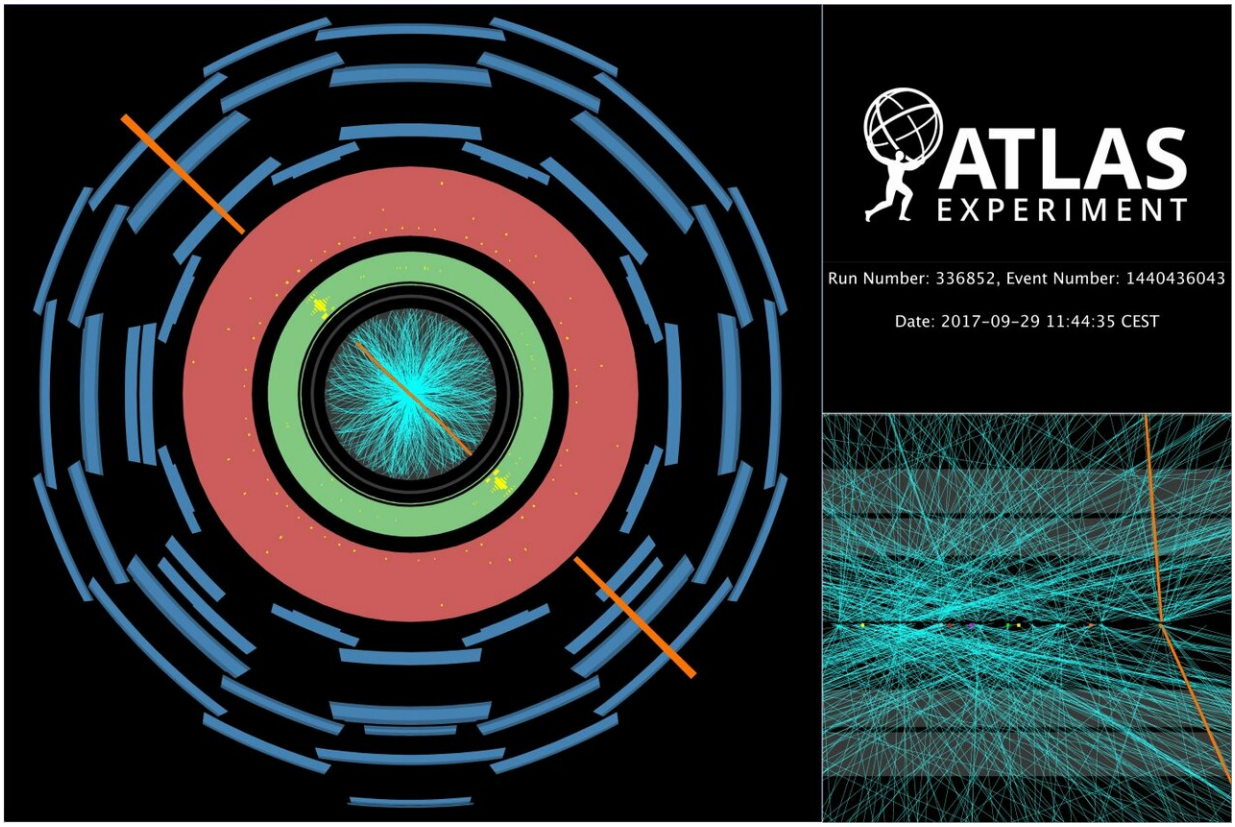

Display of a candidate event for new heavy particles decaying into two electrons. Credit: CERN

The Large Hadron Collider (LHC) is currently shut down for a major two-year upgrade programme. However, LHC researchers are busy

analysing the large dataset they have collected during the machine's second run (Run 2), which took place between 2015 and 2018. The ATLAS collaboration at CERN has now released its very first result based on this dataset. The result sets bounds on so-called grand unified theories, which might fill important gaps in the Standard Model of particle physics.

"It is amazing to see how fast the ATLAS analysis teams have incorporated the large new 2018 dataset into one homogeneous analysis of the full Run 2 data. This result relies on the outstanding and stable performance of the ATLAS detector and the full data processing and calibration chain," said ATLAS spokesperson Karl Jakobs.

Grand unified theories provide a description of the unification of the strong, weak and electromagnetic forces of the Standard Model into a single force at very high energies. These theories might even explain phenomena beyond the Standard Model such as dark matter, for which there is evidence from astrophysical observations. ATLAS physicists are searching for evidence of new heavy particles predicted by such theories, including a neutral Z' gauge boson – a hypothetical heavier cousin of the well-known Z boson responsible for the neutral weak interaction. In their latest study, the ATLAS researchers searched for such particles decaying into either two electrons or two muons, the heavier relatives of electrons.

Using a technique similar to one used to discover the Higgs boson, involving looking for an excess of events over a smooth background, ATLAS analysed these two-electron and two-muon decay data and was able to set stringent bounds on the rate at which various types of hypothetical Z' particles could be produced. Moreover, ATLAS provided the result in a generic format that allows physicists to re-interpret the data under different theoretical assumptions. For more information, visit the ATLAS website.

Provided by CERN