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CMS observes a potentially new and interesting effect

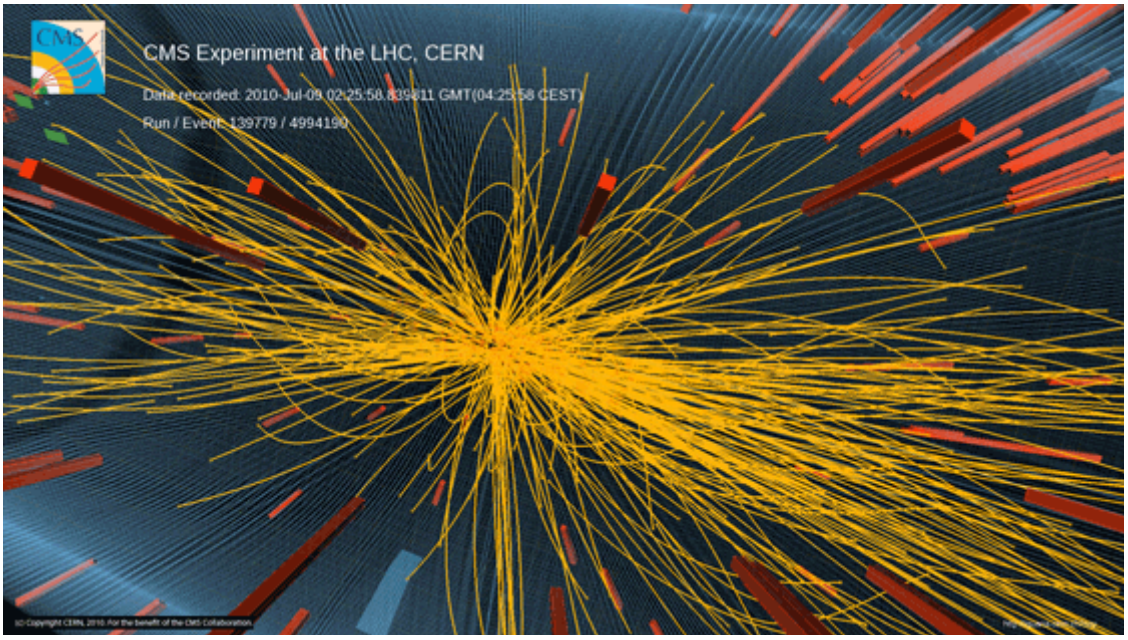

Image of a 7 TeV proton-proton collision in CMS producing more than 100 charged particles.

After almost six months of operation, experiments at the LHC are starting to see signs of potentially new and interesting effects. In results announced by the CMS collaboration today, correlations have been observed between particles produced in 7 TeV proton-proton collisions.

In some of the LHC's proton-proton collisions, a hundred or more particles can be produced. The CMS collaboration has studied such collisions by measuring angular correlations between the particles as they fly away from the point of impact, and this has revealed that some of the particles are intimately linked in a way not seen before in proton collisions.

The effect is subtle and many detailed crosschecks and studies have been performed to ensure that it is real. It bears some similarity to effects seen in the collisions of nuclei at the RHIC facility located at the US Brookhaven National Laboratory, which have been interpreted as being possibly due to the creation of hot dense matter formed in the collisions. Nevertheless, the CMS collaboration has stressed that there are several potential explanations to be considered and the collaboration's presentation to the physics community at CERN today focussed on the experimental evidence in the interest of fostering a broader discussion on the subject.

"Now we need more data to analyse fully what's going on, and to take our first steps into the vast landscape of new physics we hope the LHC will open up," said CMS Spokesperson Guido

Tonelli.

Proton running at the LHC is scheduled to continue until the end of October, during which time CMS will accumulate much more data to analyse. For the remainder of 2010 running, the LHC will collide lead nuclei.

Another CERN experiment that will be following developments with great interest is ALICE, whose detector is optimised to study collisions of nuclei. Like the experiments at RHIC, ALICE aims to study matter in the hot dense state that would have existed just tiny fractions of a second after the Big Bang in a bid to understand how such matter evolved into the ordinary nuclear matter that makes up the Universe today. The observation of proton-proton collisions producing large numbers of particles bodes well for this new phase of LHC running.

Having re-measured known physics in time for the summer conferences, the LHC experiments are now starting to probe new ground. ATLAS recently extended limits on excited quarks, while the LHCb detector has demonstrated its capacity by observing atom-like particles built from beauty quarks and antiquarks.

See also:

- New two-particle correlations observed in the CMS detector at the LHC

For recent results from ATLAS and LHCb, see:

- ATLAS sets world's best limits on q*
- Beautiful atoms at LHCb