

WEBSITE: TAKING AT CLOSER LOOK AT LHC

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Phenomenon of the Year. The Large Hadron Collider has been dubbed the "Phenomenon of the Year" by the editors of the prestigious journal Science. [Science](#) 19 December 2008.

(LHC) will restart in the summer of 2009. CERN today confirmed today (December 8th) that the Large Hadron Collider (LHC) will restart in the summer of 2009. A total of 53 magnet units have to be removed from the tunnel for cleaning or repair, of these, 28 have already been brought to the surface and the first two replacement units have been installed in the tunnel. The current schedule foresees the final magnet being reinstalled by the end of March 2009, with the LHC being cold and ready for powering tests by the end of June 2009. [www.physorg.com](#) December 2008.

Breaking ground for Linac 4. Civil engineering work has started on Linac 4, a major new renovation project for the CERN accelerator complex. It will replace Linac 2 as the first link in the proton-injector chain after commissioning is completed, which is scheduled for 2013. [CERN Courier](#). December 2008.

Large particle collider repairs to cost 16 million euro. Fixing the world's largest atom smasher will cost at least 25 million francs (\$21 million) and may take until early summer, its operator said Monday. An electrical failure shut down the Large Hadron Collider on Sept. 19, nine days after the \$10 billion machine started up with great fanfare. [The Guardian](#), November 2008.

CDF Ghost Muons. The CDF Collaboration, at Fermilab's Tevatron accelerator, has submitted for publication a new paper describing a subsample of proton-antiproton collision events in which there is at least one muon produced far from the primary proton-antiproton interaction. This subsample is not yet described by known processes, including the effects of detector/reconstruction failures, and is starting to cause somewhat of a sensation in the high energy physics community. If these events were also produced in the forward direction, LHCb would be able to measure these quite well. [Cosmic Variance](#). Novembre 2008.

CERN releases analysis of LHC incident. Investigations at CERN¹ following a large helium leak into sector 3-4 of the Large Hadron Collider (LHC) tunnel have confirmed that cause of the incident was a faulty electrical connection between two of the accelerator's magnets. This resulted in mechanical damage and release of helium from the magnet cold mass into the tunnel. [CERN Press Release](#). October 2008.

The Nobel Prize in Physics 2008: Yoichiro Nambu (USA) / Makoto Kobayashi (Japan) and Toshihide Maskawa (Japan): "For the discovery of the mechanism of spontaneous broken symmetry in subatomic physics" and "for the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature". [Nobel Prize.org](#), Octobre 2008.

Update on the LHC. Preliminary investigations revealed that a problem in an electrical connection between two magnets caused a helium leak. Between one and two tonnes of liquid helium, of the 15 tonnes in the sector, spilled into the tunnel according to Lyn Evans, Project Leader of the LHC, when he spoke at the LHCC meeting on September 24th. The investigative team believes that a faulty connection between two superconducting cables, called a bus bar splice, is to blame. These connections must be able to pass 12,000 amperes of current.

Dr Engelen is quick to point out that nothing can be known for certain until the magnets have been warmed to room temperature and opened for full inspection. While it hasn't yet been confirmed, accelerator scientists have identified a likely scenario for the cause of the helium leak. The spliced region warmed so quickly that the superfluid helium system could not keep up with the cooling demand, causing the bus bar to melt or create an electric arc – either of which could have created a hole in the helium tube. [ATLAS e-News](#). October 2008.

Let the number-crunching begin: the Worldwide LHC Computing Grid celebrates first data Today (October 3rd) , three weeks after the first particle beams were injected into the Large Hadron Collider—the world's largest particle accelerator—the Worldwide LHC Computing Grid celebrates the start of its crucial data challenge: the analysis and management of more than 15 million Gigabytes of data every year, to be produced from the hundreds of millions of subatomic collisions expected inside the LHC every second. This data-handling feat marks an essential stage in the process of enabling researchers to discover new physics. [CERN Press Release](#). Geneve, October 2008.

LHC re-start scheduled for 2009. Investigations at CERN following a large helium leak into sector 3-4 of the Large Hadron Collider (LHC) tunnel have indicated that the most likely cause of the incident was a faulty electrical connection between two of the accelerator's magnets. Geneva, 23 Sep 2008. [CERN Press release](#).

Incident in LHC sector 34. During commissioning (without beam) of the final LHC sector (sector 34) at high current for operation at 5 TeV, an incident occurred at mid-day on Friday 19 September resulting in a large helium leak into the tunnel. Geneva, 20 September 2008. [CERN Website](#).

First beam in the LHC - accelerating science. The first beam in the Large Hadron Collider at CERN was successfully steered around the full 27 kilometres of the world's most powerful particle accelerator at 10h28 this morning. This historic event marks a key moment in the transition from over two decades of preparation to a new era of scientific discovery. Geneva, 10 September 2008. [CERN PRESS RELEASE](#).

Fingers Crossed, Physicists Are Ready for Collider to Roll. At roughly 3:30 a.m. Eastern time, scientists at CERN, the European Organization for Nuclear Research, say they will try to send the first beam of protons around a 17-mile-long racetrack known as the Large Hadron Collider, 300 feet underneath the Swiss-French border outside Geneva. [NEW YORK TIMES](#), September, 2008.

If the boson of Higgs did not exist, I would never understand anything any more. PETER HIGGS, British Physicist. [Le Monde](#), September, 2008.

CERN fires up new atom smasher to near Big Bang. Europeans fire up new particle collider to see matter at birth of universe. [NEWSWEEK](#), September, 2008.

Final LHC Synchronization Test a Success. CERN has today, 25 August 2008, announced the success of the second and final test of the Large Hadron Collider's beam synchronization systems which will allow the LHC operations team to inject the first beam into the LHC. Friday evening 22 August, a single bunch of a few particles travelled down the transfer line from the Super Proton Synchrotron (SPS) accelerator to the LHC. [LHC First Beam](#), August, 2008).

LHC synchronization test successful. The synchronization of the LHC's clockwise beam transfer system and the rest of CERN's accelerator chain was successfully achieved last weekend. Tests began on Friday 8 August when a single bunch of a few particles was taken down the transfer line from the SPS accelerator to the LHC. [LHC First Beam](#), August 2008).

CERN has today announced that the first attempt to circulate a beam in the Large Hadron Collider (LHC) will be made on 10 September. This news comes as the cool down phase of commissioning CERN's new particle accelerator reaches a successful conclusion. Television coverage of the start-up will be made available through Eurovision. [CERN Press Release](#), August 2008).

LHC collisions present no danger and that there are no reasons for concern. In the light of new experimental data and theoretical understanding, the LHC Safety Assessment Group (LSAG) has updated a review of the analysis made in 2003 by the LHC Safety Study Group, a group of independent scientists. LSAG reaffirms and extends the conclusions of the 2003 report that LHC collisions present no danger and that there are no reasons for concern. [CERN 2008](#), July 2008).

Recent measurements of the bizarre properties of B-mesons hint at the existence of new fundamental particles. Tim Gershon describes how the LHCb detector at CERN's Large Hadron Collider could soon establish beyond doubt whether the effect is real. [Physicsworld.com June 2008](#)).

Earth Will Survive After All, Physicists Say. That black hole that was going to eat the Earth? Forget about it, and keep making the mortgage payments — those of you who still have them. [New York Times June 2008](#)).

Beam pipe installation. The very heart of any LHC experiment is not a pixel detector, nor or a vertex locator but a beam pipe. It is the site of each collision and the boundary where the machine and experiment meet. As an element of complex design and manufacture the CMS beam pipe was fifteen years in the making and finally fully installed on Tuesday 10th June. [CMS Times, June 2008](#)).

LHCb measures its first cosmic-ray muons. The LHCb team has for the first time measured cosmic rays passing through three of the experiment's subdetectors simultaneously, selected by muon triggers. ([CERN, Courier Jun 2008](#))

The Large Hadron Collider runs on woman power. Paola Catapano went in search of some of the women working on the LHC project, to find out about their work at CERN and talk about life in a mainly male environment. ([CERN, Courier May 2008](#))

Particle physics proves that arsenic didn't kill Napoleon. A meticulous new examination performed at the INFN laboratories in Milano-Bicocca and Pavia in Italy has shown that arsenic poisoning did not kill Napoleon. The researchers demonstrated that there is no evidence of a significant increase in the levels of arsenic in the emperor's hair during the final period of his life. ([CERN, Courier May 2008](#))

LHC hardware commissioning continues to make solid progress. Commissioning the LHC is making steady progress towards the target of achieving a complete cool down by the middle of June, allowing the first injection of beams soon after. This will come almost exactly 19 years after the start up of LEP, the machine that previously occupied the same tunnel. The LHC's first collisions will follow later. ([CERN, Courier May 2008](#))

Italian researchers claim they are first to have found dark matter. Researchers led by Dr Rita Bernabei at the University of Rome claim that a giant detector inside the mountain laboratory has picked up signs of dark matter. The signal suggests that it could be made of theoretical particles known as axions. The discovery was announced at a physics conference in Venice. The experiment was designed to detect dark matter in space as Earth flies through it. ([The Guardian Thursday April 24 2008](#)).

Will new collider create black holes that destroy us all? Protons are actually pretty complicated objects, made of little bits and pieces, and in a collision of two protons it can happen that two of the little pieces find themselves very close together. Those pieces carry a lot of energy, and due to Einstein's equation one might imagine that a lot of mass in a little space could lead to a black hole. ([Boston Globe April 21, 2008](#)).

The ATLAS collaboration celebrated lowering the final large piece of the detector into the underground cavern on 29 February 2008. The event marked a major milestone for the muon spectrometer group, as well as the final installation of large detector components below ground. ([CERN, Courier Apr 2008](#)).

Cosmic tracks were recorded in the calorimeter system and the outer tracker of LHCb detector. Because LHCb is set up with the detectors aligned in vertical planes, it is not easy to record the tracks of cosmic rays. However, there are rare cosmic rays that travel almost horizontally at a rate of a fraction of a hertz through LHCb. ([CERN, Courier Apr 2008](#)).

ALICE detector is already underway at CERN, and researchers are scrambling to add an electromagnetic calorimeter to capture jet-quenching, the newest way to look inside the quark-gluon plasma — the hot, dense state of matter that filled the earliest universe, which the Large Hadron Collider will soon recreate by slamming lead nuclei into one another. ([Science@Berkeley Lab, February 15, 2008](#)).

CERN recently celebrated the lowering of the 15th and last piece of the Compact Muon Solenoid (CMS) detector, an endcap of 1,430t, 100m underground on 10 March 2008. ([HOIST , March 2008, Issue 69](#))

New starter kit for CMS. It can take weeks to get into the groove of analyzing data from an unfamiliar detector. With a new starter kit, physicists at the Compact Muon Solenoid can cut that time to hours. ([SYMMETRY, Vol 05, Januery/February 08](#))

LHCb : un détecteur de toute beauté. Le but de LHCb est d'étudier la physique des particules contenant un quark b. LHCb prendra la suite d'expériences actuellement en fonctionnement au Japon (BELLE) et aux États-Unis (BABAR). ([ELEMENTAIRE. Equinoxe d'été 2007](#)).

Asking a Judge to Save the World, and Maybe a Whole Lot More. Walter L. Wagner and Luis Sancho contend that scientists at CERN, have played down the chances that the collider could produce, among other horrors, a tiny black hole, which, they say, could eat the Earth. ([The New York Times , March 29, 2008](#)).