

CERN – LHC NEWS 2014-2016

WEBSITE: TAKING AT CLOSER LOOK AT LHC

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**2013/14.** Long Shutdown (LS) for the whole accelerator complex (LS1) LS1 was started as the project for the repair of the magnet interconnects to allow operating LHC at 14 TeV cms.

**2015.** An important achievement with Run I data was the first observation (CMS + LHCb experiments) of the very rare decay of the  $B^0_s$  particle into two muon particles:  $B^0_s \rightarrow \mu^+ \mu^-$ . These decays are studied as they could open a window to theories beyond the Standard Model, such as supersymmetry.

LHC experiments are back in business at a new record energy -13 TeV- almost double the collision energy of its first run. This marks the start of season 2 at the LHC, opening the way to new discoveries. The LHC will now run round the clock for the next three years.

CERN's LHCb experiment reports observation of exotic pentaquark particles. *The pentaquark is not just any new particle. It represents a way to aggregate quarks in a pattern that has never been observed before in over fifty years of experimental searches. Studying its properties may allow us to understand better how ordinary matter, the protons and neutrons from which we're all made, is constituted.*

The LHC collides ions at new record energy. Colliding lead ions allows the LHC experiments to study a state of matter that existed shortly after the big bang, reaching a temperature of several trillion degrees.

CERN Director-General Rolf Heuer passes the baton to Fabiola Gianotti. Geneva, 18 December 2015: the 178th session of the CERN Council today saw the handover ceremony from Rolf Heuer, CERN's Director-General for the past seven years, to Fabiola Gianotti, who will take up her functions at the head of the Organization on 1 January 2016.

**2016.** Chicago sees floods of LHC data and new results at the ICHEP 2016 conference . Particle physicists are showcasing a wealth of brand new results from the Large Hadron Collider (LHC) experiments at CERN at the "ICHEP 2016"<sup>2</sup> conference in Chicago. With a flood of new data, the

experiment collaborations can now dive in and explore at the new energy frontier of 13 TeV, following last year's first glimpse of physics at this unprecedented energy level. LHC collaborations are presenting more than 100 different new results, including many analyses based on newly taken 2016 data. In particular, the intriguing hint of a possible resonance at 750 GeV decaying into photon pairs, which caused considerable interest from the 2015 data, has not reappeared in the much larger 2016 data set and thus appears to be a statistical fluctuation.

The LHC MoEDAL experiment publishes its first paper on its search for magnetic monopoles. The MoEDAL experiment at CERN<sup>1</sup> narrows the window of where to search for a hypothetical particle, the magnetic monopole. Over the last decades, experiments have been trying to find evidence for magnetic monopoles at accelerators, including at CERN's Large Hadron Collider. Such particles were first predicted by physicist Paul Dirac in the 1930s but have never been observed so far.

CERN welcomes Romania as its twenty-second Member State. On Monday, 5 September 2016, the Romanian flag was raised in front of CERN for the first time, marking the country's accession to Membership of the Organization.

16 Dec 2016 — Following the notification of the completion of its internal approval procedures, Slovenia will join Cyprus and Serbia as an Associate Member State

19 Dec 2016 — In a Nature paper, the ALPHA collaboration reports the first ever measurement on the optical spectrum of an antimatter atom.