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Run II of the LHC: The Accelerator Science

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In 2015 the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN) starts its Run II operation. After the successful Run I at 3.5 TeV and 4 TeV in the 2010-2013 period, a first long shutdown (LS1) was mainly dedicated to the consolidation of the LHC magnet interconnections, to allow the LHC to operate at its design beam energy of 7 TeV. Other key accelerator systems have also been improved to optimize the performance reach at higher beam energies. After a review of the LS1 activities, the status of the LHC start-up progress is reported, addressing in particular the status of the LHC hardware commissioning and of the training campaign of superconducting magnets that will determine the operation beam energy in 2015. Then, the plans for the Run II operation are reviewed in detail, covering choice of initial machine parameters and strategy to improve the Run II performance. Future prospects of the LHC and its upgrade plans are also presented.