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Search for new physics at the LHC and prospects for new discoveries

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The Large Hadron Collider (LHC) at CERN has allowed the ATLAS and CMS experiments to collect a large amount of proton-proton collision data at 7 TeV and 8 TeV centre-of-mass energies. This dataset was used to discover a Standard Model (SM) Higgs-like boson at a mass of about 125 GeV. Beside this, an impressive number of searches for deviations from the SM expectations have been carried out in various physics areas including: Higgs, SuperSymmetry (SUSY) and Exotics physics. Representative searches in all of these domains will be presented and their impact on theories “beyond the SM” assessed. To date, there is no evidence in the LHC data of a deviation from the SM. However, a few legacy 2-3 sigma deviations remain from both experiments, which will be reviewed. After an 18-month shutdown, the LHC is about to deliver collision data at an increased centre-of-mass energy of 13 TeV. It will be a very exciting time for both the ATLAS and CMS experiments to confirm or rule out the existing deviations from the SM. In addition, the large increase in collision energy will allow much improved sensitivity in various searches, in particular for high mass particles.

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