The long journey to the Higgs boson and beyond at the CERN LHC

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ABSTRACT

The discovery of the Higgs boson in July 2012 was the result of a long and fascinating story at the Large Hadron Collider at CERN. Building up the experimental programme with this unique high-energy collider, and developing the very sophisticated detectors built and operated by world-wide collaborations, meant an incredible scientific and human adventure, spanning more than three decades. The LHC has to be seen as a global project with its three pillars: the collider, the experiments, and the grid-computing infrastructure, all this of course motivated by the underlying physics theory of the Standard Model (SM) of particle physics, as well as the search for windows into New Physics beyond the SM. In the first part this talk will recall the initial motivation for the project, tracing its history, as well as illustrate some of the many milestones that finally led to the Higgs boson discovery by the ATLAS and CMS Collaborations some 5 years ago, including the two Argentina ATLAS teams from UBA and UNLP. In the second part the focus of the talk will shift to new ATLAS results, including also very recent analyses from the ongoing 13 TeV Run-2 of LHC. These concern both improved measurements on the fundamental properties of the Higgs boson as well as examples of searches for physics beyond the SM. And this is only the beginning of a fantastic journey into unchartered physics territory with the LHC, which will be pursued with an upgraded collider and improved detectors for two decades to come, leading into the high-luminosity LHC phase.