

The beauty of the Higgs boson

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Eleven years ago two experiments of the Large Hadron Collider, ATLAS and CMS, announced the observation of a new particle. A new particle with properties consistent with the Higgs boson, the last missing ingredient from the Standard Model's zoo of particles, the manifestation of the Higgs field permeating all the space and mass donor for all fundamental particles according to the Standard Model of particles. Since 2012, more than 30 times as many Higgs bosons have been recorded by the ATLAS experiment which allowed us to do more precise studies of this particle. What do we know today that we did not know in 2012? Are there still missing pieces on the Higgs field puzzle? What is the future of the Higgs physics looking like?

In this talk I will provide an overview of latest results from the multiple unprecedented number of production and decay processes of the Higgs boson scrutinized in ATLAS. Also will discuss the future of the Higgs physics in view of the different future colliders projects currently proposed. And I will make special emphasis on the importance of understanding our detectors and develop cutting-edge data analysis methodologies in order to achieve the understanding we have today of the Standard Model.

References:

ATLAS Collaboration. A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery. *Nature* volume 607, pages 52–59 (2022)