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Searches For Higgs Boson Pair Production In Final States With Two Bottom Quarks And Two Tau Leptons At The LHC

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The large hadron collider (LHC) is a particle accelerator located inside a 27 km circular tunnel near Geneva, Switzerland, primarily built to shed light on the nature of the electroweak symmetry breaking and to examine the mathematical consistency of the standard model (SM) of particle physics at energies above 1 TeV [1]. The two beams of relativistic protons accelerated in the tunnel of the LHC are crossed at 4 locations, one of which is surrounded by the compact muon solenoid (CMS), a multi-purpose detector primarily optimised for muon identification as well as momentum and energy resolution of charged particles [2].

The detection of the Higgs boson by the ATLAS and CMS collaborations in 2012 [3, 4] marked the fulfilment of one of the major science goals of the LHC. With the mass of the Higgs determined at 125 GeV, the structure of the Higgs scalar field potential can be calculated precisely within the SM. This theoretical prediction can be compared to experimental results through the measurement of the Higgs pair production cross section, which in turn allows the calculation of the structure of the Higgs scalar field potential [5]. In this contribution, the speaker will present the approaches for both resonant and non-resonant Higgs boson pair production searches with the CMS detector and discuss the possible application of machine-learning methods to the event selection and classification.

References

- [1] Lyndon Evans and Philip Bryant. "LHC machine". In: Journal of instrumentation 3.08 (2008), S08001.
- [2] The CMS Collaboration et al. "The CMS experiment at the CERN LHC". In: Jinst 803 (2008), S08004.
- [3] Serguei Chatrchyan et al. "Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC". In: Physics Letters B 716.1 (2012), pp. 30-61.
- [4] Georges Aad et al. "Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC". In: Physics Letters B 716.1 (2012), pp. 1-29.
- [5] "Prospects for HH measurements at the HL-LHC". In: (2018).

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