



ID de Contribution: 6

Type: Non spécifié

Triple Higgs production at the LHC and ATLAS results

mardi 25 novembre 2025 11:40 (25 minutes)

Ten years after the discovery of the Higgs boson by the ATLAS and CMS experiments, the study of its properties remains one of the main targets of LHC physics.

Among these properties, the Higgs self-coupling parameters are of particular interest, as they are directly related to the shape of the Higgs potential: the SM Higgs Lagrangian contains two self-interaction terms corresponding to trilinear and quartic interactions.

While direct production of two Higgs bosons (HH) provides the most sensitive test of the Higgs trilinear self-coupling, in order to access the quartic Higgs self-coupling the investigation of Triple Higgs production (HHH) is necessary.

HHH production processes are extremely rare at the LHC (roughly 1000 times more than HH pair production) and constitute a very difficult experimental challenge.

In this presentation I propose to discuss the phenomenological framework which motivates the study of HHH production at the LHC as a probe of the Higgs potential parameters, as well as a window towards new physics, to discuss the ATLAS results in the search for HHH production in the 6 bottom-quark decay channel [1], and furthermore to highlight the projection of these results towards the HL-LHC phase [2].

While this process in the SM is still out of reach of the current experimental sensitivity, it represents a growing area of interest (with recent results from the CMS collaboration as well), which would benefit from further discussions among experimentalists and theorists.

[1] <https://journals.aps.org/prd/abstract/10.1103/PhysRevD.111.032006>

[2] <https://cds.cern.ch/record/2924772>

Auteur: PANDINI, Carlo (LPSC)

Orateur: PANDINI, Carlo (LPSC)

Classification de Session: Higgs and Electroweak

Classification de thématique: Higgs