



Contribution ID: 187

Type: Oral Presentation

Unearthing kinematic information in WH production

Thursday, August 1, 2019 3:07 PM (23 minutes)

The associated production of a Higgs and a W boson is an important channel not only for observing the Higgs decay to b quark pairs, but also for examining the interactions of the Higgs and gauge fields. Using the inference toolkit MadMiner, which combines matrix element information and machine learning techniques, we examine the sensitivity of this production mode to non-Standard Model (SM) interactions arising in the context of the SM Effective Field Theory. These modern inference techniques maximize the sensitivity to new physics effects by exploiting all the kinematic information in the process and also help us understand how this information is distributed in phase space. In particular, this lets us rigorously evaluate the sensitivity of traditional approaches using histograms of a small number of observables. Based on our study we propose improvements to the recently implemented “Simplified Template Cross Section” templates for the Higgstrahlung process in order to increase the experimental sensitivity of beyond the SM physics at the LHC.

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Session Classification: Higgs & Electroweak Physics

Track Classification: Higgs & Electroweak Physics