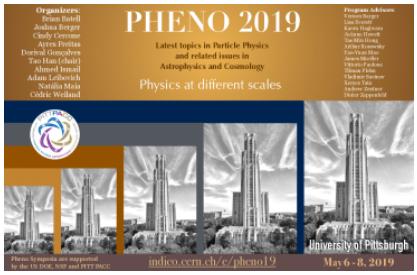

Contribution ID: **744** Type: **parallel talk**

Portraying Double Higgs Production with Deep Neural Networks

Tuesday 7 May 2019 15:15 (15 minutes)

We investigate the discovery potential for double Higgs production in a relatively overlooked $hh \to b\bar{b}WW^* \to b\bar{b}\ell^+\ell^- + \not{\vec{P}}_T$ final state. We supplement a novel kinematic method presented in Ref.[1] with jet images resulting from the $h \to b\bar{b}$ decay. Two b-quarks from the decay of the Higgs boson, are color-connected with each other. In contrast, two b-quarks in $t\bar{t}$ production (the major background) arise from the decays of top quarks, which are color-connected with initial states. Since the difference in color-flow will be reflected in the resulting hadron distributions, we utilize a Convolutional Neural Network (CNN) trained on jet images for the signal-to-background discrimination. We design a DNN architecture to successfully combine new kinematic variables and jet images. As a result, we can obtain a sizable improvement on the signal sensitivity. We discuss relative improvements at each stage and the correlations among different input variables. The proposed method can be easily generalized to the semi-leptonic channel. The $b\bar{b}WW^*$ channel would contribute to the combined analysis of double Higgs production along with the other final states.

[1] J. H. Kim, K.C. Kong, K. T. Matchev and M. Park, Probing the Triple Higgs Self-Interaction at the Large Hadron Collider, Phys.Rev.Lett. 122 (2019) no.9, 091801, [1807.11498].

Summary

Authors: KIM, Jeong Han (University of Kansas); Mr KIM, Minho (POSTECH); KONG, Kyoungchul; MATCHEV, Konstantin (University of Florida (US)); Prof. PARK, Myeonghun (Seoultech)

Presenter: KIM, Jeong Han (University of Kansas)

Session Classification: Higgs II