

Abstract: The current strategy employed by the ATLAS collaboration in searches for the Higgs boson produced in association with a vector boson makes extensive use of Boosted Decision Trees to enhance the separation of the signal process from the dominant backgrounds. However, an additional cross check analysis is performed where the invariant mass of the two jets in the event is used as the discriminant, in order to fit a more well defined physics observable.

By using adversarial techniques, these two methods can be combined by training a classifier to separate the signal from the background but remaining uncorrelated to the Higgs mass. The classifier is subsequently used to define signal enriched and depleted regions, and the Higgs mass is used as the discriminant entering the statistical analysis. This method could help control background modelling in the most signal enriched regions, as well as allow for both the W/Z and Higgs boson mass peaks to be fit simultaneously.