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Hyper-parameter optimization in the search for new resonances using weak supervised learning

We present an approach to search for heavy resonances. We focus particularly on the heavy resonances decaying into $Z\gamma$. The search is carried out in the di-lepton channel with two electrons˜(muons) in the final state. This study is based on data from the ATLAS experiment gathered during the LHC Run-2, which corresponds to an integrated luminosity of 139 fb^{-1}. The goal is to set up a Deep Neural Network (DNN) based on weakly supervised learning to search for heavy resonances. DNN's can learn from large volumes of complex data and find non-linear feature combinations which as a result, are a useful tool for exploring large amounts of data in High Energy Physics. Hyper-parameters in combination with deep neural networks are used to search for resonances in the Z final state.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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