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Study the Di-Higgs Detection Sensitivity With the ATLAS Detector Using Machine-Learning Approach With XGBoost XIUYUAN ZHANG, BING ZHOU[1], University of Michigan, ATLAS COLLABORATION — I will present my study on the di-Higgs detection sensitivity with Machine-Learning analysis technique. The di-Higgs decay channels used in my study include bb , bb WW, and bb ZZ. The experimental final state is bbll+E_T^{miss}. My analysis is based on the ATLAS analysis framework and ROOT (the HEP analysis package). We studied the kinematic distributions of the events from signal and background processes based on Monte Carlo simulated events and compared these distributions with data collected by the ATLAS experiment in Run 2. We first determined and applied event selection cuts to variables which have discriminate power to increase the signal detection sensitivity. Then, using XGBoost (boosted Decision tree program), we trained a multi-class BDT to separate the di-Higgs decay signal from background events to further increase the signal detection sensitivity. Preliminary results show that detection sensitivity could be improve by about a factor of three compared to cut-based analysis.

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