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Cut-based analysis of the Z-associated Higgs-strahlung process Z(H->WW) using data from the ATLAS experiment and Monte Carlo simulations

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In the Standard Model of particle physics, there exist several modes by which a Higgs boson may be produced, and several modes by which it may decay. In order to accurately characterize it via measurement of its couplings to other particles, the statistically significant combinations of these production and decay modes must be studied. An analysis of one such combination is presented here, using data from the ATLAS experiment at CERN and Monte Carlo simulated (MC) samples: the Z-associated Higgs-strahlung process, $f\bar{f} \rightarrow Z(H \rightarrow WW^*)$. A set of selection criteria (cuts) for events is optimized to maximize signal-to-background; this optimization is done against MC samples of the relevant background and signal processes in order to avoid bias from the data. Additionally, subsets of the data and MC samples orthogonal to the signal region are studied to determine *scale factors*, which are applied to the normalization of the MC samples to correct for mismodelling. Both the cuts and scale factors are frozen before unblinding the data. Finally, the results obtained from applying the cuts to the data and MC samples are used to set a limit on the ZH production cross-section (statistics are not sufficient for a direct calculation of the value), which will eventually be used in a fit to determine the aforementioned coupling strengths.

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