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Measurements of Higgs Bosons Decaying to Bottom and Charm Quarks from Vector Boson Fusion Production with the ATLAS Experiment

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Using 126 fb-1 of Run 2 data collected with the ATLAS detector, a measurement of the $b\bar{b}$ decay of the Standard Model Higgs boson produced through vector boson fusion yielded a signal strength corresponding to an observed (expected) significance of 2.6 (2.8) standard deviations from the background only hypothesis. This talk will focus on improving the previous measurement by utilizing new developments such as: (1) a new trigger strategy implemented at the end of Run 2 to target inclusive VBF final state, (2) improvements in flavor tagging using newly developed tagger GN2, (3) as well as improvements of the adversarial neural network used for multivariate analysis for the signal extraction. Using 52 fb-1 of Run 3 data, this analysis is combined with the previous Run 2 analysis and adds additional sensitivity to $b\bar{b}$ decay of the Standard Model VBF Higgs production. Additionally, the inclusive VBF trigger with 90fb-1 of data is used to measure the limit of $c\bar{c}$ decay of the Standard Model Higgs produced through vector boson fusion.

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