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Search for decays of the Higgs Boson to bottom quarks via Associated Vector Boson production at the ATLAS experiment

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To demonstrate whether the particle discovered in 2012 is the Standard Model (SM) Higgs boson, all of its couplings to other SM particles have to be measured. In the SM, the coupling of the Higgs boson to fermions has a strength proportional to the mass of the fermion. Since the b-quark is the heaviest particle that the Higgs can kinematically decay into, it has the largest branching ratio. The measurement of this branching ratio is key for testing the SM and for constraining models of physics beyond the SM.

This talk will present the efforts of the ATLAS experiment to measure the Higgs decay to b quarks via associated Vector Boson production (VHbb). We make use of 79.8 fb⁻¹ of proton-proton collision data at the centre-of-mass energy of $\sqrt{s} = 13$ TeV, collected by the ATLAS detector between 2015 and 2018. An excess of events was found over the expected background from other SM processes with an observed (expected) significance of 4.9 (4.3) standard deviations. Combination with data taken in 2011 and 2012 yielded an observed (expected) significance of 5.4 (5.5) standard deviations, providing observation of the Higgs decay into b-quarks.

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