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Search for Dark Matter Produced in Association with the Standard Model Higgs Boson Decaying to $b\bar{b}$ at $\sqrt{s} = 13$ TeV with the ATLAS Detector

The existence of Dark Matter is inferred from several astrophysical and cosmological observations. Several extensions of the Standard Model accommodating Dark Matter constraints predict associated production of Dark Matter particles with the Standard Model Higgs boson. Such models are searched for in final states with large missing transverse momentum and a Higgs boson decaying to a pair of b-quarks with the ATLAS detector using 36.1 fb−1 of pp collisions at a center-of-mass energy of 13 TeV at the LHC. An optimized selection together with an improved Higgs boson identification in boosted topologies leads to a significant improvement in sensitivity compared to previous searches. The observed data are in good agreement with the Standard Model predictions. Thus, limits are placed on the production cross-section of Dark Matter particles with a Higgs boson for a simplified model with two Higgs doublets and a heavy vector mediator. In addition, stringent model-independent limits are placed on the production cross-section of non-SM events at detector level which can be reinterpreted in the context of a wider range of theoretical models for the production of this signature.

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Experimental Collaboration

ATLAS

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