

# Search for Invisibly Decaying Vector Boson Fusion Produced Higgs Bosons with 139/fb of pp collisions with the ATLAS Detector

Wednesday, 29 July 2020 13:42 (3 minutes)

While the Standard Model (SM) predicts a branching ratio of the Higgs boson decaying to invisible particles of  $O(0.001)$ , the current measurement of the Higgs boson coupling to other SM particles allows for up to 30% of the Higgs boson width to originate from decays beyond the SM (BSM). The small SM-allowed rate of Higgs boson decays to invisible particles can be enhanced if the Higgs boson decays into a pair of weakly interacting massive particles (WIMPS), which may explain the nature of dark matter. The Vector Boson Fusion (VBF) production mechanism of the Higgs boson provides a distinctive signature (with two forward jets that are largely separated in pseudorapidity leading to a large invariant mass) that can be used to target events with invisible Higgs decays, where particles invisible to the detector are a source of missing transverse energy. The most recent ATLAS results of VBF-produced Higgs bosons decaying invisibly are presented, utilizing the full Run-2 dataset of 139/fb of 13 TeV center-of-mass proton-proton collisions. Further interpretations set limits on the VBF production of other heavy scalars, and the WIMP-nucleon cross-section.

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**Secondary track (number)**

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**Session Classification:** Higgs Physics - Posters

**Track Classification:** 01. Higgs Physics