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Combination of searches for Higgs boson decays into a photon and a massless dark photon using pp collisions at 13 TeV with the ATLAS detector

A combination of searches for Higgs boson decaying into a visible photon and a massless dark photon(H->yyd) is presented using 139fb-1 of proton-proton collision data at a centre-of-mass energy of sqrt(s)=13TeV recorded by the ATLAS detector at the Large Hardron Collider. The observed(expected) 95% confidence level upper limit on the Standard Model Higgs boson decay branching ration is determined to be B(H->yyd) < 1.3%(1.5%). The search is also sensitive to higher-mass Higgs bosons decaying into the same final state. The observed (expected) 95% CL imit on the cross section times branching ratio ranges from 16 fb (26 fb) for mH = 400 GeV to 1.0 fb (1.5 fb) for mH = 3 TeV. Results are also interpreted in the context of a minimal simplified model.

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