

# YSF: Search for a dark photon in resonant mono-photon signatures from Higgs boson decays

Thursday, November 10, 2022 6:00 PM (12 minutes)

The search for dark photon ( $\gamma_d$ ) in resonant mono-photon signatures from the Higgs boson decay  $H \rightarrow \gamma \gamma_d$  in the ZH production mode with  $Z \rightarrow ll$  has been performed using 139 fb<sup>-1</sup> of proton-proton collision data recorded with the ATLAS detector at a centre-of-mass energy  $\sqrt{s} = 13$  TeV at the Large Hadron Collider during the 2015-2018 Run 2. A global fit to the Boosted Decision Tree (BDT) score, including all background processes, has been performed to estimate the excess of events that could be interpreted as a possible signature of  $H \rightarrow \gamma \gamma_d$  in the final state. Dominant backgrounds, consisting in fake  $E_{\text{miss}}$  and  $e \rightarrow \gamma$ , have been estimated using data-driven techniques: an ABCD method has been implemented for fake  $E_{\text{miss}}$  while  $e \rightarrow \gamma$  fake-rates have been estimated via  $Z \rightarrow ee$  boson decay and applied in dedicated probe- $e$  CRs. Results covering a  $\gamma_d$  mass range from massless up to 40 GeV are provided in terms of limits on the branching ratio of such a decay mode of the Higgs boson.

## Type of talk

Experimental measurements

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**Session Classification:** Thursday Session B

**Track Classification:** Physics Topics: Beyond the Standard Model