

# Limits on an Exotic Higgs Decay From a Recast ATLAS Four-Lepton Analysis

*Tuesday 25 February 2025 14:55 (15 minutes)*

The ATLAS collaboration, using  $139 \text{ fb}^{-1}$  of 13 TeV collisions from the Large Hadron Collider, has placed limits on the decay of a  $Z$  boson to three dark photons. We reproduce the results of the ATLAS analysis, and then recast it as a limit on an exotic Higgs decay mode, in which the Higgs boson decays via a pair of intermediate (pseudo)scalars  $a$  to four dark photons  $V$  (or some other spin-one meson). Across the mass range for  $m_a$  and  $m_V$ , we find limits on the exotic Higgs branching fraction  $\text{BR}(H \rightarrow aa \rightarrow VVVV)$  in the range of  $4 \times 10^{-5}$  to  $1 \times 10^{-4}$ .

**Authors:** CHENG, Junyi (Harvard University); LI, Lingfeng (Brown University); STRASSLER, Matthew (Harvard University); HUSAIN, Rabia (Harvard University)

**Presenter:** CHENG, Junyi (Harvard University)

**Session Classification:** Reinterpretation studies (pheno)