

# YSF: Search for a pair of pseudoscalars in decays of the Higgs boson in CMS

*Thursday, November 10, 2022 2:00 PM (12 minutes)*

Several Beyond Standard Model theories motivate an extended Higgs sector. Searches for additional Higgs bosons, based on these predictions, constitute an intensive subject of study within CMS. The two Higgs doublet models (2HDM) are by now heavily constrained. But models, where the two Higgs doublets are extended by one additional Higgs singlet complex field (2HDM+S), remain consistent with SM measurements as well as constraints from searches for additional Higgs bosons and supersymmetry with a considerable phase-space still unconstrained. The Higgs sector of the 2HDM+S models features seven physical states: three CP-even, two CP-odd, and two charged bosons. The current constraints from H(125) couplings measurements allow a non-negligible branching fraction for H(125) decays into non-SM particles, thus making the lightest pseudoscalar boson of the 2HDM+S models,  $a_1$ , potentially accessible in the  $H(125) \rightarrow a_1 a_1$  decay, with a sufficiently high rate to be detected at the LHC. This talk will present an overview of the searches performed in CMS on exotic decays of the Higgs boson to a pair of pseudoscalars during the Run 2 data-taking period. It will cover the wide spectrum of probed decay channels which span an extensive range of masses of the pseudoscalar boson from very boosted to non-boosted topologies.

## Type of talk

Experimental measurements

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**Session Classification:** Thursday Session B

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