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Di-Higgs Production via Axion Like Particles

Due to the pseudo-scalar nature of the axion-like particle (ALP), the CP-conserving production of two Higgs bosons via the ALP necessarily involves an additional Z or γ boson. We examine the existing constraints from di-Higgs searches at Run 2 of the LHC and find that, despite the presence of extra objects in the final state, these searches are sensitive to ALP couplings. We compare the Higgs EFT predictions to the SMEFT linear realization of the EWSB and the ALP couplings. Finally we propose a dedicated search for these final states.

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