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Search for New Physics in the Merged Diphoton plus Photon final state with the CMS Detector

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New physics at the LHC may be hiding in non-standard final state configurations, particularly in cases where stringent particle identification could obscure the signal. Here we present a search for resonances in the three-photon final state where two photons are highly merged. We target the case where a heavy vector-like particle decays to a photon and a new spin-0 particle ϕ , where ϕ is light and decays to two photons, resulting in a merged diphoton signature. To classify and obtain the relevant kinematic properties of these merged photons, we use a convolutional neural network that takes individual crystal deposits in the CMS electromagnetic calorimeter as input. This method performs remarkably well for these highly merged decays where standard particle identification fails.

Mini Symposia (Invited Talks Only)

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