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Preliminary studies on a search for Higgs boson pair production in association with a top quark-antiquark pair JADE CHISMAR, SAMUEL MAY, INDARA SUAREZ, Boston University, CMS COLLABORATION — We present preliminary studies on a search for Higgs boson pair production in association with a top quark-antiquark pair (ttHH), a process which has not yet been searched for at the LHC. In the Standard Model (SM), ttHH has a very small cross section of 0.775 fb at a center-of-mass energy of 13 TeV, however, this could be modified by a variety of theories of physics beyond the SM (BSM). Among these theories are type-II Two Higgs Doublet Models, where a ttHH final state may result from heavy Higgs boson production in association with a top quark-antiquark pair and subsequent decay of the heavy Higgs boson into two SM Higgs bosons, and Composite Higgs Models, where a ttHH final state may result from pair production of vector-like top partners (T) with subsequent T $\rightarrow$ tH decays. ttHH rates may also be modified by BSM couplings, like the ttHH contact interaction. We target ttHH events in which one H decays to two photons, and the other H decays to a pair of bottom quarks, tau leptons, or W bosons. One of the most challenging backgrounds in the diphoton final state is single Higgs boson production in association with a top quark-antiquark pair (ttH). This poster presents the results of studies to reduce the ttH contamination in a search for ttHH.

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