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Multivariate techniques for detection of $ttH \to \gamma\gamma$ events in AT-LAS at $\sqrt{s} =$ 13 TeV JENNET DICKINSON, Univ of California - Berkeley, ATLAS COLLABORATION — Higgs production in association with top quarks (ttH) is predicted by the Standard Model at a rate of about 1% of the total Higgs cross section. This process directly probes the Higgs-top coupling, a critical parameter for isolating Beyond the Standard Model contributions to Higgs physics. The ATLAS search for ttH events in conjunction with the decay $H \to \gamma\gamma$ takes advantage of the high photon detection efficiency and energy resolution of the ATLAS electromagnetic calorimeter, as well as the relatively low rate of diphoton background processes. The application of multivariate techniques to separate $ttH \to \gamma\gamma$ from diphoton backgrounds improves the sensitivity to ttH compared to a simple cut-based analysis. With 36.1 fb^{-1} of data, the expected significance in the $ttH \to \gamma\gamma$ channel is 1.7σ, while the observed significance is 0.9σ. In combination with other Higgs decay channels, $ttH \to \gamma\gamma$ contributes to evidence for ttH production at the 4.2σ level in 36.1 fb^{-1} of data.

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