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ML for ttgamma in ATLAS

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Through the associated production of the ttgamma process the strength of the electromagnetic gauge coupling of the top quark and the photon can be measured. The measurement of this fundamental parameter of the Standard Model (SM) also serves as a test of the vector structure of the electromagnetic interaction and a probe to new physics beyond the SM such as potential tensor contributions. Evidence of this process was found by CDF at the Tevatron at sqrt(s) = 1.96 TeV. The process was later observed in ATLAS and CMS at sqrt(s) = 7 and sqrt(s) = 8 TeV with increased precision. Different deep neural network (DNN) approaches are used to improve the separation of signal and background processes. Binary, as well as multi-class neural networks for separating ttgamma signal processes from underlying background events and other machine learning techniques for separating individual types of backgrounds are
presented using proton-proton collisions data, taken between 2015 and 2018 with the ATLAS detector. Furthermore, a neural network for separating prompt photons from fake photons is presented. Signal and background processes are hereby grouped into two or multiple different classes. A dedicated overview of machine learning techniques within the scope of a ttgamma cross section measurement is given.

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