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Production of top pair events with additional radiation using the ATLAS detector at the LHC.

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The large centre-of-mass energy available at the proton-proton collider LHC allows for the copious production of top quark pairs in association with other final state particles at high transverse momentum. The ATLAS experiment has measured several final state observables that are sensitive to additional parton radiation in top anti-top quark final states. Examples are the multiplicity of jets for various transverse momentum thresholds or the probability to emit jets above a given threshold in a fixed rapidity region. These measurements are compared to modern Monte Carlo generators based on NLO QCD matrix element or LO multi-leg matrix elements. The data are able to constrain the uncertainty on the modelling of the top pair production mechanism. We also discuss top production in association with photons and Z bosons.

In addition, we discuss production of top quark pairs in association with heavy quarks (beauty and charm).

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