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Measurement of jet production with the ATLAS detector and extraction of the strong coupling constant

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The production of jets at hadron colliders provides a stringent test of perturbative QCD at the highest energies. The process can also be used to probe the gluon density function of the proton. Specific topologies can be used to extract the strong coupling constant.

The ATLAS collaboration has recently measured the inclusive jet production cross section in data collected at a center-of-mass energy of 8TeV and 13TeV. The measurements have been performed differentially in jet rapidity and transverse momentum. The collaboration also presents a first measurement of the di-jet cross section at a center-of-mass energy of 13TeV as a function of the di-jet mass and rapidity. The results have been compared with state-of-the-art theory predictions at NLO in pQCD, interfaced with different parton distribution functions and can be used to constrain the proton structure.

We also present new measurements of transverse energy-energy correlations (TEEC) and their associated asymmetries (ATEEC) in multi-jet events at a center-of-mass energy of 8TeV. The data is unfolded to the particle level and compared to the expectations from parton shower Monte Carlo programs as well as from next-to-leading order perturbative QCD calculations. The latter are also used to extract the strong coupling constant and test the renormalization group equations.

Experimental Collaboration

ATLAS

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