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Measurements of light and heavy-flavour jet production in association with a W or Z boson with the ATLAS detector

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Productions of light and heavy-flavour jets in association with a W or a Z boson in proton-proton collisions are important processes to study QCD in multi-scale environments and the proton parton content. The cross section, differential in several kinematics variables, have been measured with the ATLAS detector in 7 TeV proton-proton collisions and compared to high-order QCD calculations and Monte Carlo simulations. The results demonstrate the need for the inclusion of high-multiplicity matrix elements in the calculations of high jet multiplicities, even in cases where a parton shower simulation is present and confirm QCD jet production scaling properties. The ratio of (Z+jets)/(W+jets) provides a precise test of QCD due to the large cancellations of theoretical and experimental uncertainties.

Measurement of W+c production cross section has a unique sensitivity to the strange-quark density, which is poorly known at low x. W or Z boson production in association with b-quark jets, on the other hand, probes the b-quark density in the proton and the b-quark production by high-order QCD processes. The experimental results are compared to leading-order and next-to-leading-order QCD calculations and various parton density predictions.

Summary

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