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Studies of the underlying-event properties and of hard double parton scattering with the ATLAS detector

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A correct modelling of the underlying event in proton-proton collisions is important for the proper simulation of kinematic distributions of high-energy collisions. The ATLAS collaboration extended previous studies at 7 TeV with a leading track or jet or Z boson by a new study at 13 TeV, measuring the number and transverse-momentum sum of charged particles as a function of pseudorapidity and azimuthal angle in dependence of the reconstructed leading track. These measurements are sensitive to the underlying-event as well as the onset of hard emissions. The results are compared to predictions of several MC generators.

Inclusive four-jet events produced in proton–proton collisions at a center-of-mass energy of 7 TeV have been analyzed for the presence of hard double parton scattering collected with the ATLAS detector. The contribution of hard double parton scattering to the production of four-jet events has been extracted using an artificial neural network. The assumption was made that hard double parton scattering can be represented by a random combination of dijet events. In addition, a sample enriched with double parton scattering events was extracted and several characteristics of these events were studied. The measurements have been compared to different MC generator predictions.

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