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Beyond-DGLAP searches with Mueller-Navelet jets, and measurements of low- p_T and forward jets at CMS

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We present searches for beyond-DGLAP resummation effects in production of dijets with large rapidity separation in pp collisions at $\sqrt{s}=7\text{TeV}$. Ratios of inclusive over exclusive dijet production cross sections and dijet azimuthal decorrelations are presented as a function of rapidity separation between jets. Measurements are compared to predictions of conventional LO+PS MC generators as well as MC generators incorporating elements of the BFKL approach and analytic NLL BFKL calculations.

The azimuthal correlation between forward and central jets is measured in proton-proton collisions at the LHC, at the centre-of-mass energy of 7 TeV. The forward jet is reconstructed in the hadronic forward (HF) calorimeter in the pseudorapidity region $3.2 < |\eta| < 4.7$, while the central jet is limited to $|\eta| < 2.8$. At least one central jet and one forward jet are required to have transverse momentum of $p_T > 35$ GeV. The azimuthal angle between the jets is measured for different separations in pseudorapidity, with the largest separation being $\Delta\eta = 7.5$ units. The analysis is carried out for inclusive dijet events and for two subsamples, one where an additional jet is required between the forward and the central jet, and one where the additional jet is vetoed. Comparisons between data and several different Monte Carlo models and tunes show a large sensitivity to the modeling of QCD radiation.

Measurements of the differential cross sections for the production of exactly four jets in proton-proton collisions are presented as a function of the transverse momentum p_T and pseudorapidity η , together with the correlations in azimuthal angle and the p_T balance among the jets. The data sample was collected in 2010 at a center-of-mass energy of 7 TeV with the CMS detector at the LHC, with an integrated luminosity of 36pb⁻¹. The cross section for exactly 4 jets, with 2 hard jets of $p_T > 50$ GeV each, together with 2 jets of $p_T > 20$ GeV each, within $|\eta| < 4.7$ is measured to be $\sigma = 330 \pm 5$ (stat) ± 45 (syst) nb. It is found that the addition of parton showers to fixed-order matrix element calculations describe the measured differential cross sections in only some regions of phase space and that including a contribution from double parton scattering in the models brings the predictions closer to the data.

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