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High Energy Jets at 100 TeV

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The production of multiple hard jets in hadronic collisions takes on a different character as the centre-of-mass energy increases. The importance of higher-order terms in the perturbative series (and therefore of higher multiplicity events in inclusive samples) is enhanced both because of the massive increase in phase space and due to the large logarithmic corrections at all orders. The High Energy Jets (HEJ) framework combines hard-scattering matrix elements with a systematic resummation of the leading logarithms in s/t at all orders in α_s. The approach has currently been applied to the production of dijets, Higgs-plus-dijets, W-plus-dijets and Z-plus-dijets and it has already been seen in LHC Run I data that the inclusion of these logarithms is important to give a correct description of data in challenging regions of phase space. In a recent ATLAS W-plus-dijet study for example, the HEJ predictions gave a good description in the region of large invariant mass (where the logs in s/t are large) where other standard descriptions struggled. This has clear implications for the accurate description of multi-jet processes within VBF cuts in Higgs analyses.

In this talk, I will outline the High Energy Jets framework and the existing evidence from LHC Run I that we are already sensitive to the logarithms uniquely included in HEJ. Motivated by this, I will go on to explore the impact of these corrections in 100 TeV collisions in inclusive jet rates, inclusive distributions including invariant mass and rapidity distributions before and after VBF cuts and also the average number of jets as a function of rapidity and Ht.

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