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Jets at high multiplicity

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Facing ever higher energies at the LHC we are confronted with a huge amount of hadronic activity. However, the channels with many jets will also be among the most interesting ones. To either claim any discovery or proclaim yet another victory of the standard model we have to understand high multiplicity jet radiation precisely. Jet radiation in certain phase space regions shows particular patterns known as staircase respectively Poisson scaling. A common approach to high multiplicities are Parton Showers. However, from the random nature of Monte Carlo Markov Chains we are not able to understand, and thus trust and use, the occurrence of such patterns in our favor. Instead, we use the generating functional formalism of jet radiation as a tool to understand these patterns from a re-summation point of view. Although, this gives us a general handle to understand scaling patterns from first principles in QCD, it is not enough to understand the effects at a hadron collider. Therefore, we study additional sub-leading effects in the generating functional formalism as well as the effect of geometrical phase space effects in great details. This allows us to understand busy high multiplicity events much better. In addition, we also analyze the intermediate splitting scales as a first step in the study of more general scaling features in QCD.

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