

What is a parton shower?

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We present a formulation for a parton shower at an arbitrary order of perturbation theory, with the aim of indicating how a parton shower can be understood as a systematically improvable approximation, similarly to ordinary perturbative calculations of cross sections. The formalism requires input functions that represent the soft and collinear singularities of QCD at the requisite perturbative order. The structure of the shower is unified with the structure of subtraction terms that remove soft and collinear singularities from a perturbative hard scattering cross section. The formalism is exact in the quantum color and spin variables for the partons.

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