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Quark jet fraction in multi-jet final states and quark gluon discrimination

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We calculate quark and gluon jet fraction in multi-jet final states based on perturbative QCD at double logarithmic accuracy. We derive a measurable scaling pattern of the fraction, which is related to a performance for quark-gluon jet tagging technique using QCD jet substructure. We also propose a data-driven method to use the tagging technique in large jet multiplicity.

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