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Exploring the universality of jet quenching via Bayesian inference

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Experimental data on a wide range of jet observables measured in heavy ion collisions provide a rich picture of the modification of jets as perturbative probes and of the properties of the created quark-gluon plasma. However, their interpretation is often limited by the assumptions of specific quenching models, and it remains a challenge to establish model-independent statements about the universality in different jet quenching observables.

In this work, we propose a treatment that is agnostic to the details of the jet-medium interactions and relies only on the factorization picture of QCD. Bayesian inference is used to learn the quark- and gluon-jet quenching directly from experimental data of inclusive jet observables. Evidence of the universality of jet quenching is provided by validating the learned jet energy loss through the prediction of photon-tagged jet measurements, for which the quark/gluon fraction differs from that in inclusive jets, across momenta. The extracted posterior distributions can then serve to retrieve theoretical insight in a data-driven way, and can be employed to constrain theoretical models for jet quenching.

Category

Theory

Collaboration

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