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Linear Boltzmann Transport for Jet Propagation in the Quark-Gluon Plasma: Medium-induced Gluon Radiations and Medium Recoil

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A Linear Boltzmann Transport model within perturbative QCD is developed for the study of parton propagation inside the quark-gluon plasma. Our previous work has shown that thermal recoil partons have significant influences on jet shape, fragmentation functions and angular distribution of reconstructed jets [Nucl. Phys. A931 (2014) 460-464; Nucl. Phys. A932 (2014) 99-104; Phys. Rev. C91 (2015) 054908]. In this study, we implement the medium-induced gluon radiation processes and find the radiative contribution dominates over the elastic one. For both situations, we investigate parton energy loss, transverse momentum broadening and their nontrivial energy and length dependence. All partons, including leading partons, thermal recoil partons and the radiated gluons, are tracked so that one can also study jet-induced medium excitations. We further investigate medium modifications of the jet shape and fragmentation functions of reconstructed jets.

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