Jet quenching on hadron yields and ratios at RHIC and LHC

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Abstract

The production and interaction of jets dominates physical observables in the high transverse-momentum region in ultrarelativistic heavy-ion collisions. One of these observables is the energy loss of high-energy jets ("jet quenching"). This phenomenon is an excellent diagnostic tool to investigate the properties of hot and dense matter. In a new calculation the energy loss was determined in the realistic case of a few scattering centers ($N_{scat} = 1, 2, 3, ...$), and found a quadratic dependence on the opacity (L/λ) of the surrounding matter. The results of this calculation are applied in a perturbative QCD based study of pion and kaon production in heavy-ion collisions at RHIC ($\sqrt{s} = 56,\ 130$ A GeV). Absolute hadron yields display a close to linear shift with increasing energy loss. However, certain particle ratios (K^+/π^+, K^-/K^+) show detectable modifications due to jet quenching. We also discuss our results at LHC energy.

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