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Path-length dependence of parton energy loss in Pb-Pb and O-O collisions using JEWEL and Trajectum

The path-length dependence of energy loss in the quark-gluon plasma (QGP) has been extensively studied through perturbative quantum chromodynamics (pQCD), where energy is lost through both radiative and collisional processes. Collisional energy loss is expected to scale linearly with the path-length L , while radiative energy loss scales as L^2 , and is known to be the dominant mechanism. Taking a step away from analytical and parametrized energy loss models, JEWEL (Jet Evolution With Energy Loss), a Monte Carlo event generator, simulates jet quenching in heavy-ion collisions by explicitly modeling the full parton shower. JEWEL includes both radiative and collisional processes through medium-induced gluon emissions and computed pQCD calculations. To isolate the path-length dependence of energy loss, a brick medium in JEWEL is employed. The brick medium assumes the QCD medium has uniform temperature and density over a finite time interval. From this approach, the jet and charged hadron nuclear modification factor R_{AA} can be obtained as a function of L . This study is then extended by using a realistic hydrodynamic background from *Trajectum*, which acts as an external medium in JEWEL, providing a medium description for heavy-ion collisions. Preliminary results for the emerging path-length dependence from JEWEL will be presented, by comparing the brick medium and realistic hydrodynamic backgrounds.

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