Heavy quark three-body collisional energy loss in quark-gluon plasma

C. M. Ko and Wei Liu

Heavy quark drag coefficients due to three-body elastic scattering in a quark-gluon plasma are evaluated in the lowest order in QCD [1]. They are found to have similar values as those due to two-body elastic scattering, and both are larger than those due to two-body radiative scattering if the momenta of charm and bottom quarks are below about 4 and 9 GeV/*c*, respectively. Shown in Fig.1 is the nuclear modification factor for electrons from heavy quark decays in central Au+Au collisions at center of mass energy $s^{1/2}_{NN}$=200 GeV. Results obtained from including two-body elastic scattering are given by the dotted line. Including also two-body radiative scattering gives the dashed line. Adding the contribution from three-body elastic scattering leads to the solid line. The dash-dotted line is obtained by using the strong QCD coupling constant from the lattice calculations in calculating all the drag coefficients. It is seen that including three-body elastic scattering increases the momentum degradation of heavy quarks in QGP, bringing the nuclear modification factor for electrons from the decays of produced heavy mesons closer to the measured one.

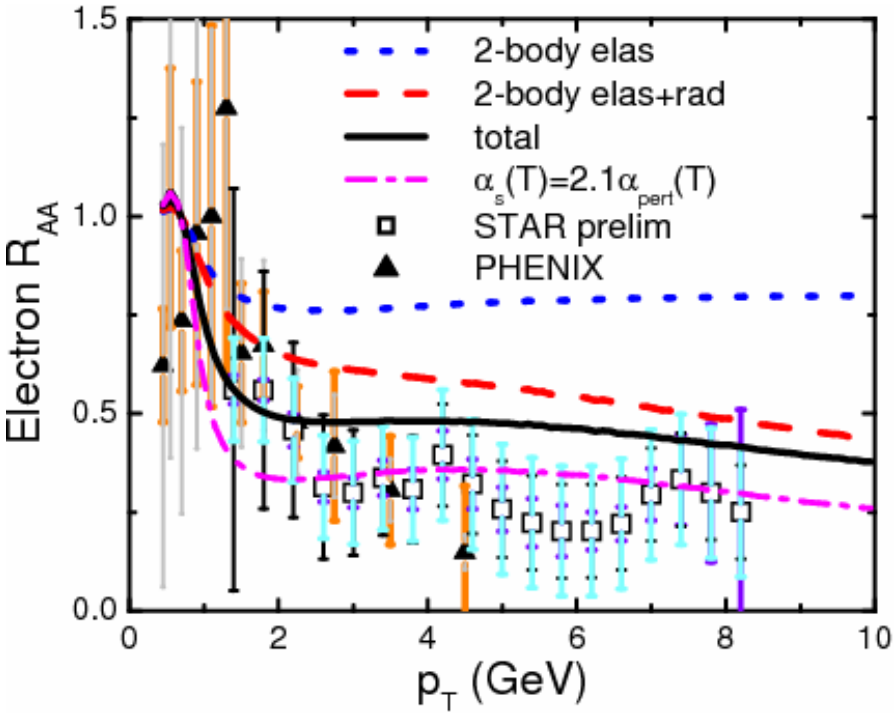

Figure 1. Nuclear modification factor R_{AA} for electrons from heavy quark decays in central Au+Au collisions at center of mass energy $s^{1/2}_{NN}$=200 GeV for different heavy quark energy loss mechanisms.

[1] C.M. Ko and W. Liu, Nucl. Phys. **A783**, 233 (2007).