論文内容の要旨

論文題目

Measurement of Single Electrons from Semi-Leptonic Decay of Heavy Quarks in Au+Au Collisions at $\sqrt{s_{NN}}$ = 200 GeV

重心系衝突エネルギー200 AGeV 金・金衝突における

重いクォークの半レプトン崩壊からの単電子の測定

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Strong suppressions of light flavored mesons in high transverse momentum (p_T) region at midrapidity have been observed in high energy heavy-ion collisions at the Relativistic Heavy Ion Collider (RHIC). These suppressions are well explained by "partonic energy loss", or "jet quenching" effect, where high-p_T-scattered gluons and light quarks suffer a significant energy loss by gluon radiations in the extremely dense matter. These results reveal that the medium created at RHIC is not conventional hadronic matter.

Open charms/bottoms are also important probes for high energy heavy ion collisions. So far, the energy loss of heavy quarks was theoretically predicted to be smaller than that of light quarks due to their large masses ("dead cone effect"). To measure open charm/bottom in high energy heavy ion collisions, we performed an indirect measurement in the PHENIX experiment, which is to measure single electrons ($0.3 < p_T < 9$ [GeV/c]) from semileptonic decays of heavy quarks at midrapidity ($|y| < 0.35$) in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV (RHIC Year-4 run).

The obtained invariant yield as a function of p_T shows a very strong suppression relative to the expectation from p+p collisions. On the other hand, the total invariant yield has binary-scaling property. These results indicate that heavy quarks also suffer the substantial energy loss in the medium produced at RHIC, but can not be explained by typical models of partonic energy loss, which are applied to suppression phenomena of light flavored mesons.