High p_T identified hadrons in large and small systems measured in PHENIX

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March 4. 2020.

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Detector

PHENIX, beam view

Collisions

Beam-beam counters are used to determine the event centrality. The mean number of participating nucleons (N_{part}) and the binary collisions (N_{coll}) in various centrality intervals are estimated with a Glauber model Monte-Carlo simulation folded with the BBC response.

Au+Au and Cu+Au collisions with comparable N_{part}

Hadron identi cation ^{0} and

Invariant mass distribution for gamma-gamma pair

Hadron identi cation K^0_S and K

The K^0_S mesons are reconstructed by combining the ^{0} candidates in pairs within the same event.

The K^0 and $\overline{K^0}$ mesons are reconstructed via the K^+ and K^+

Hadron identi cation

Invariant mass distributions obtained with the \two kaons PID" and \no PID" methods after subtraction of the combinatorial background estimated using the event-mixing technique. Plot on the top corresponds to integrated p_T range whereas plot on the bottom is for the range 2< p_T (GeV/c)< 3. The \no PID" spectrum is t to the sum of a Breit-Wigner fuction convolved with a Gaussian function to account for the signal, and a polynomial function to account for the residual background.

Mesons

^{0} invariant yield

invariant yield

Mesons

R_{AB} for K and meson > R_{AB} for ^{0} and at low p_T in central events
Di erence disappears at high p_T

R_{AA} for , and ^{0} in Cu+Au in di erent centrality bins

Mesons

Strange quark dependence also present in U+U collisions at low p_T

Nuclear modi cation factors of ^{0} , and K_S mesons as functions of $_T$p for di erent U+U centrality intervals.

Comparison of ^{0} R_{AB} measured in Cu+Au, Au+Au and Cu+Cu collisions. It suggests that ^{0} suppression mostly depends on the energ density and size of the produced medium.
Corona-e ect?

$= {}^{0}$

Ratios of and ^{0} yields measured as a function of p_T in di erent centrality intervals.
The QGP does not a ect the jet fragmentation into these light mesons.

Similar results in Au+Au.

K_S

R_{AA} of K_S in di erent collision systems.

Baryons

Enhancement of $(\bar{p} + p)/2$ yield at moderate p_T

Baryons

R_{AA} of (p + p)/2 consistent across Cu+Au and Au+Au at similar N_{part}

Summary large systems

Strangeness dependence in R_{AA} at low p_T in central events

R_{AA} for all meson species converges at high p_T

Ratios of and ^{0} is similar to other large systems

Corona-e ect is either non-existent or very small

Same baryon enhancement seen in Cu+Au and Au+Au

Small System

^{0}, p+Au note the di erent p_T scale!

^{0}, p+Au, d+Au

^{0}, p+Au, d+Au, He+Au

Ordering:
$R_{pAu} > R_{dAu} > R_{HeAu}$
in 0-20% at intermediate p_T range.
Hint of ^{0} suppression in central collisions.

R_{pAu} R_{dAu} R_{HeAu}
Hint of ^{0} enhancement in peripheral collisions at high p_T .