Production of K(892)^{*0} mesons in Cu+Au collisions and U+U collisions

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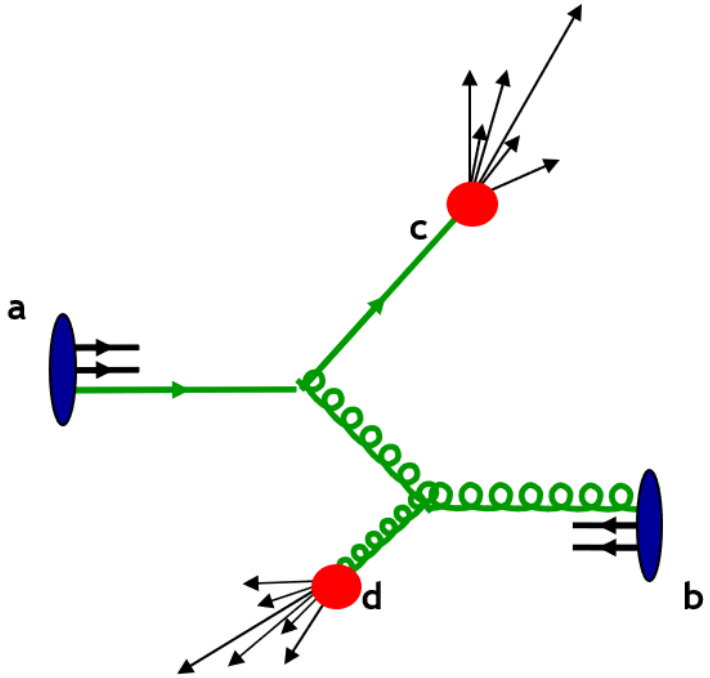
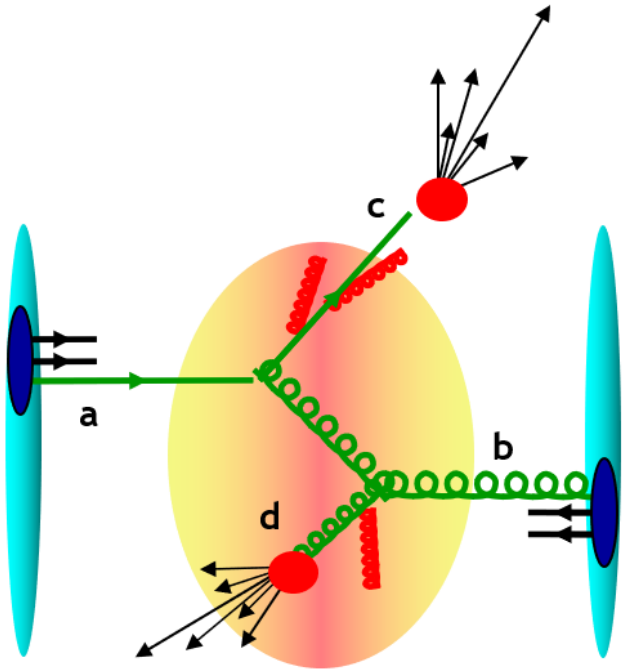
Motivation

Signatures of QGP formation: *Jet quenching*

p+p collisions



A+B collisions

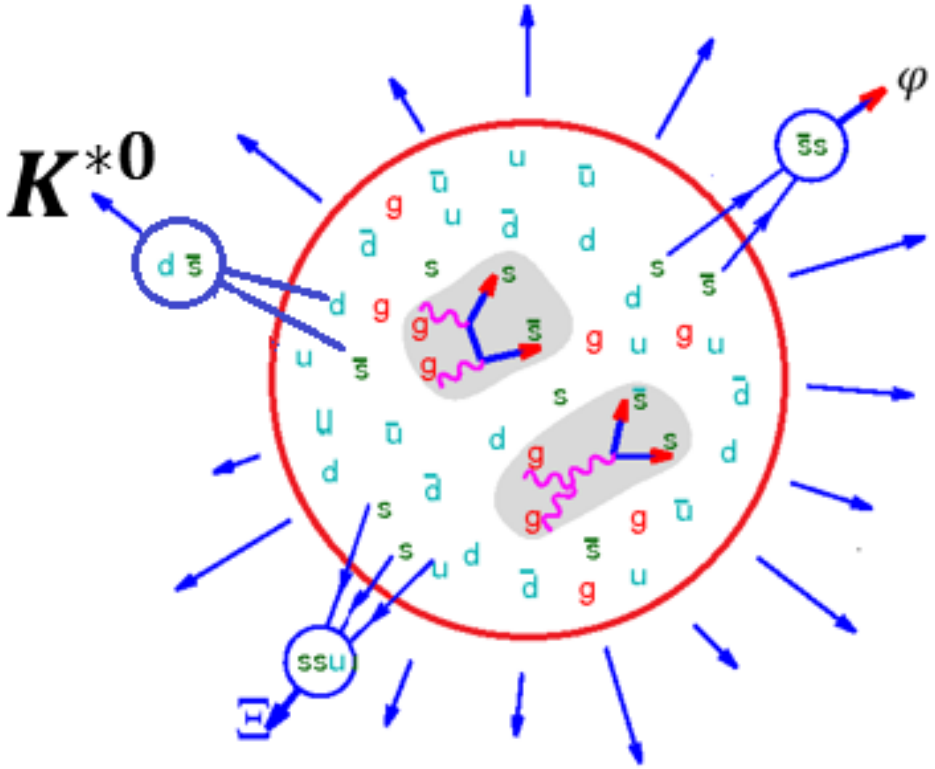


Motivation

Signatures of QGP formation: Strangeness enhancement

$K^{*0} \rightarrow (K\pi)^{\pm}$-meson

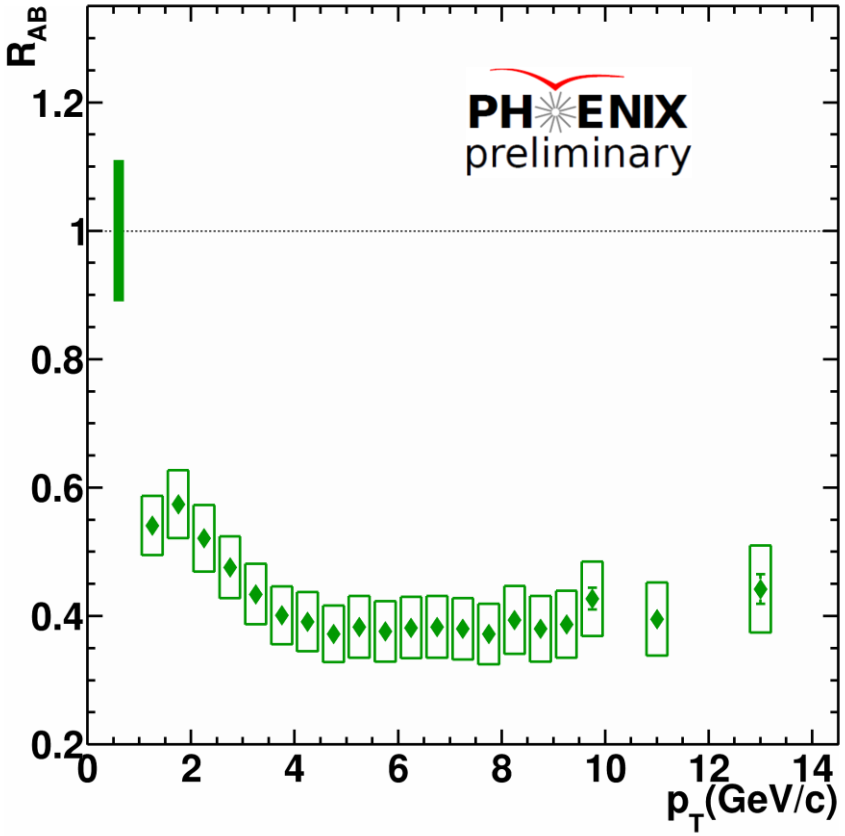
Quark content	$d\bar{s}(\bar{d}s)$
Mass, (MeV/c^2)	891.66±0.26
Lifetime, fm/c	4.16



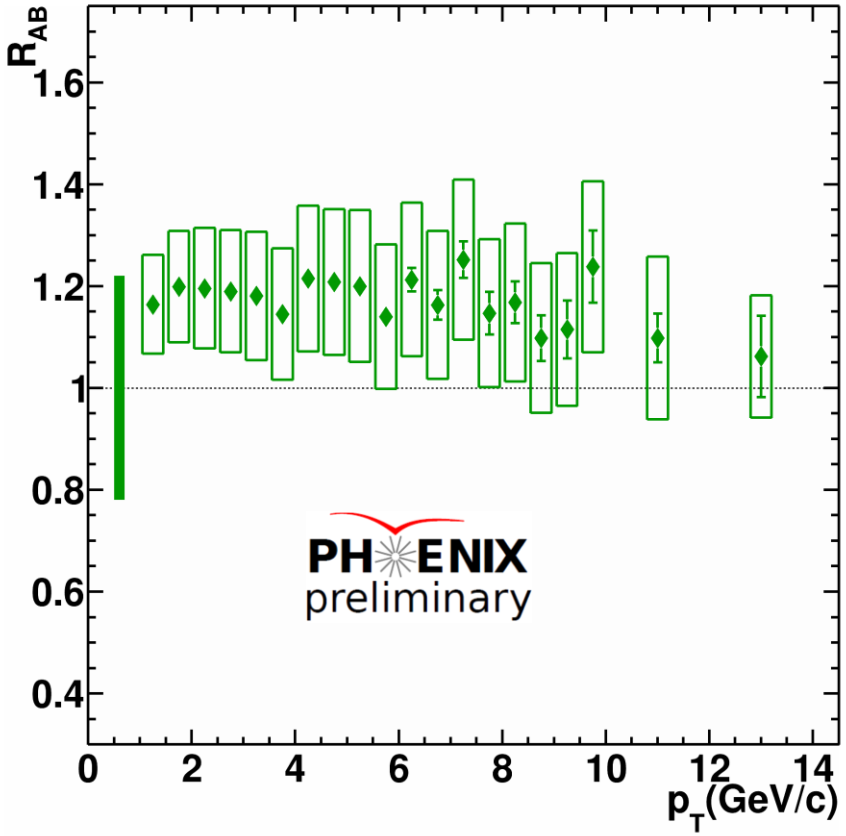
Motivation

CuAu

Most central



Most peripheral



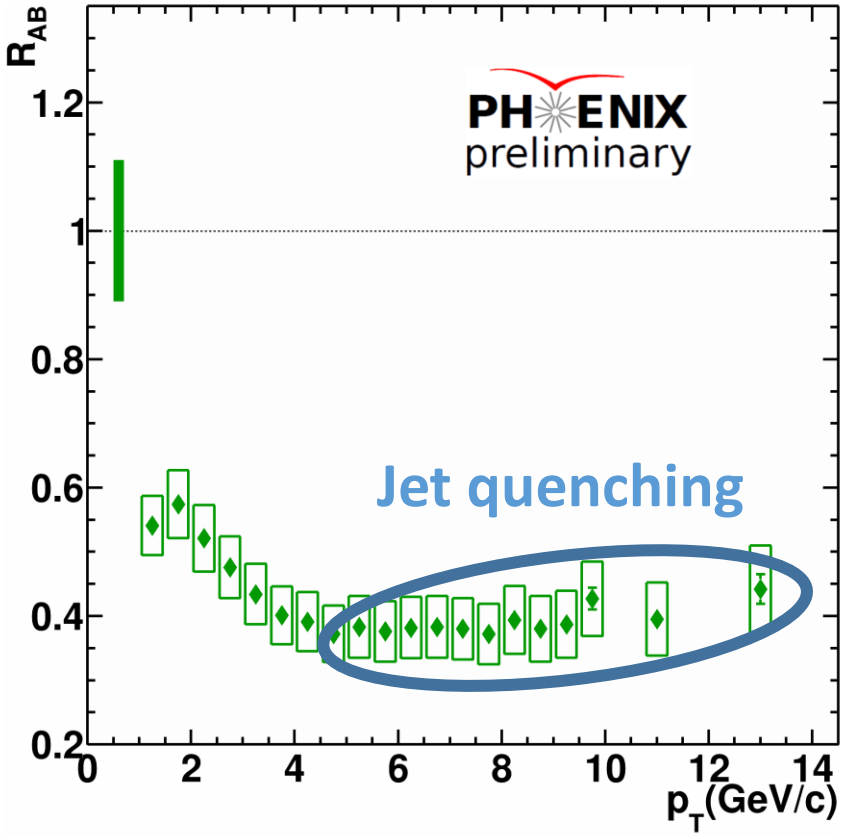
π^0

$$\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}$$

Motivation

CuAu

Most central



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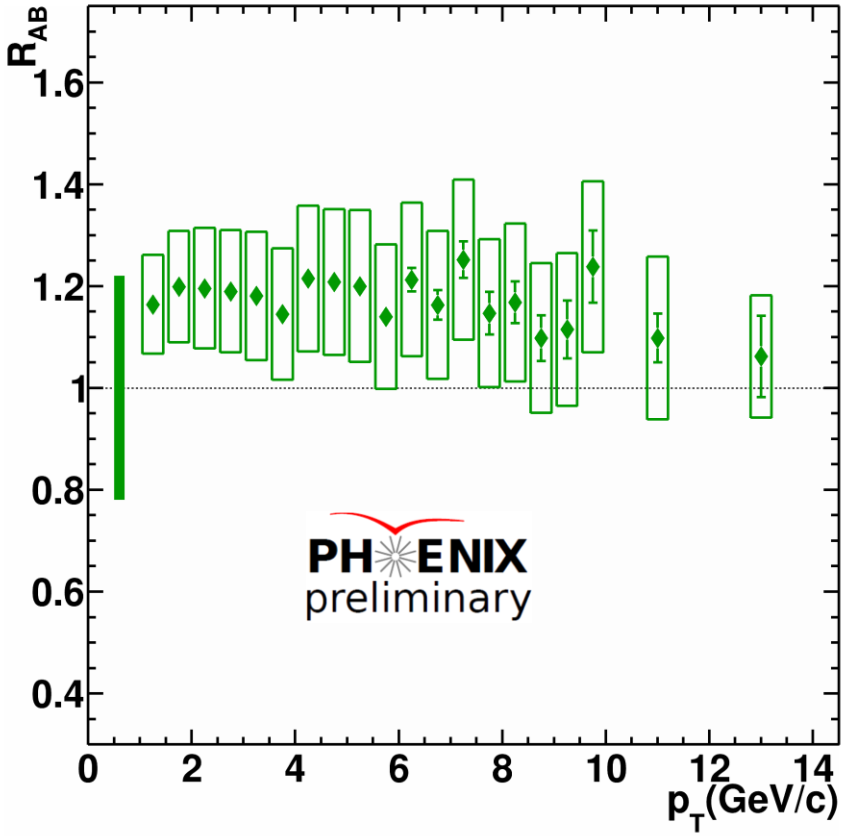

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Motivation

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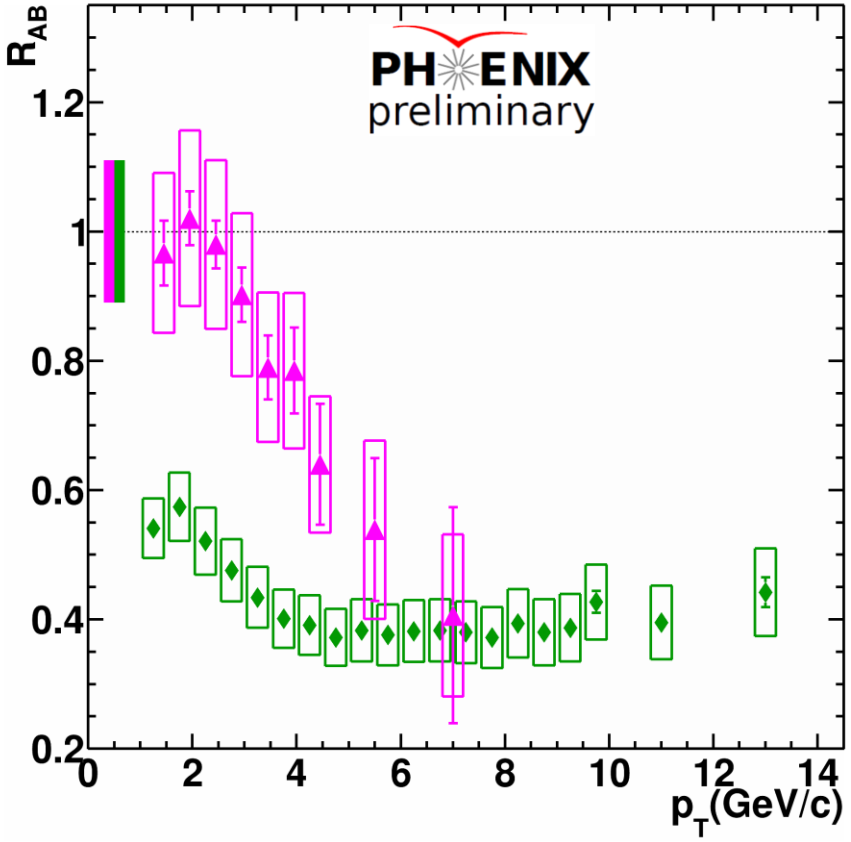
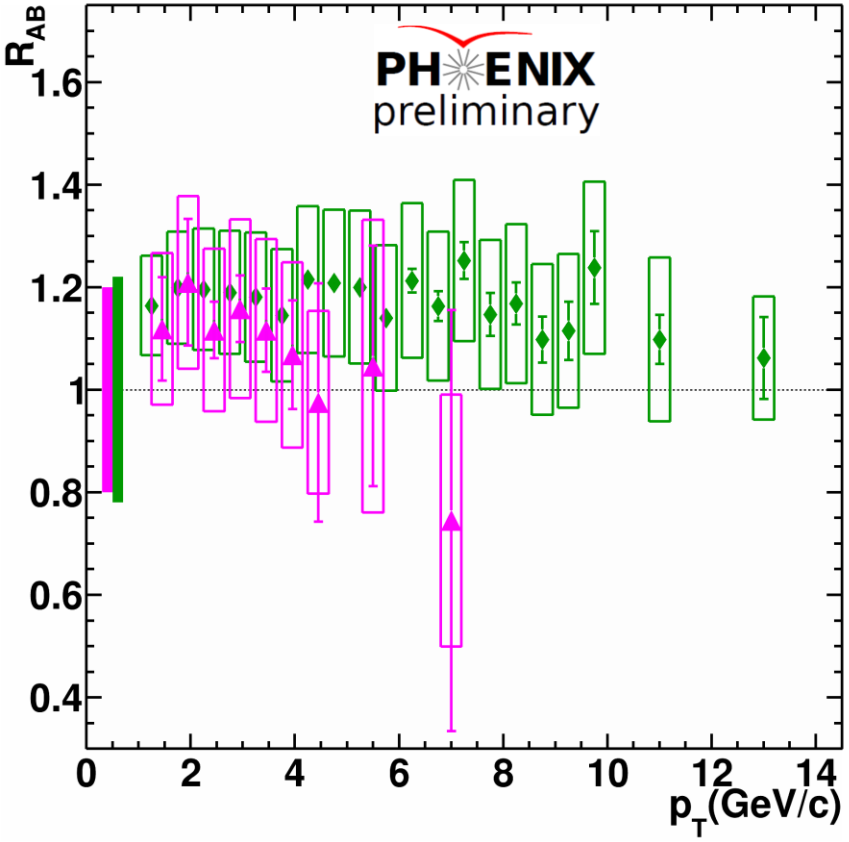


Most peripheral



φ

$s\bar{s}$

π^0

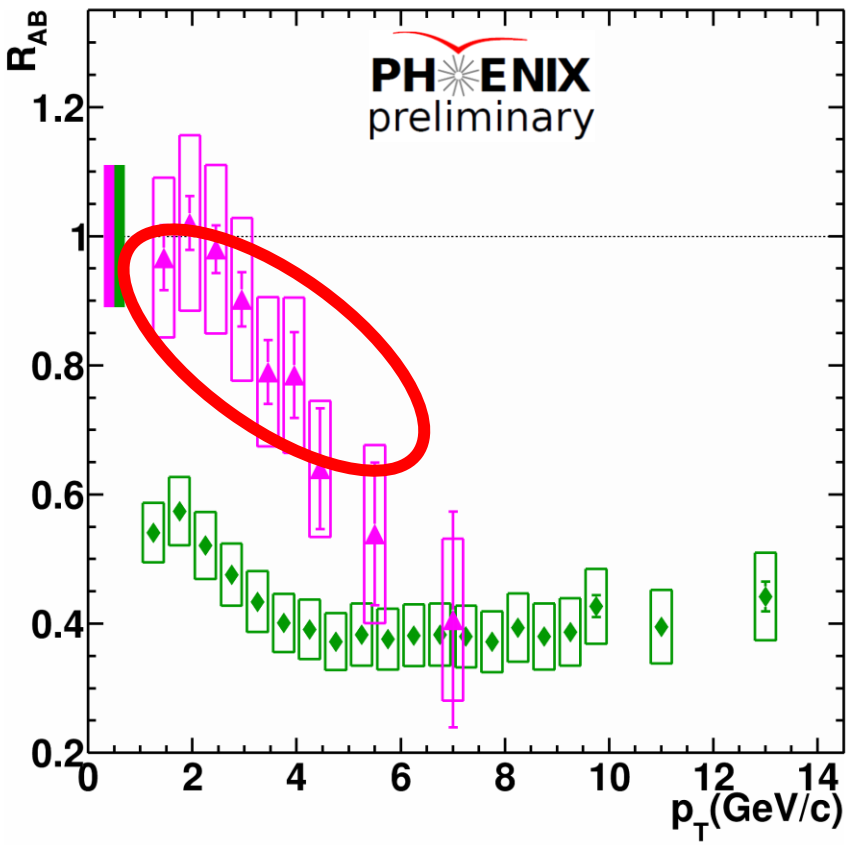
$\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}$

Motivation

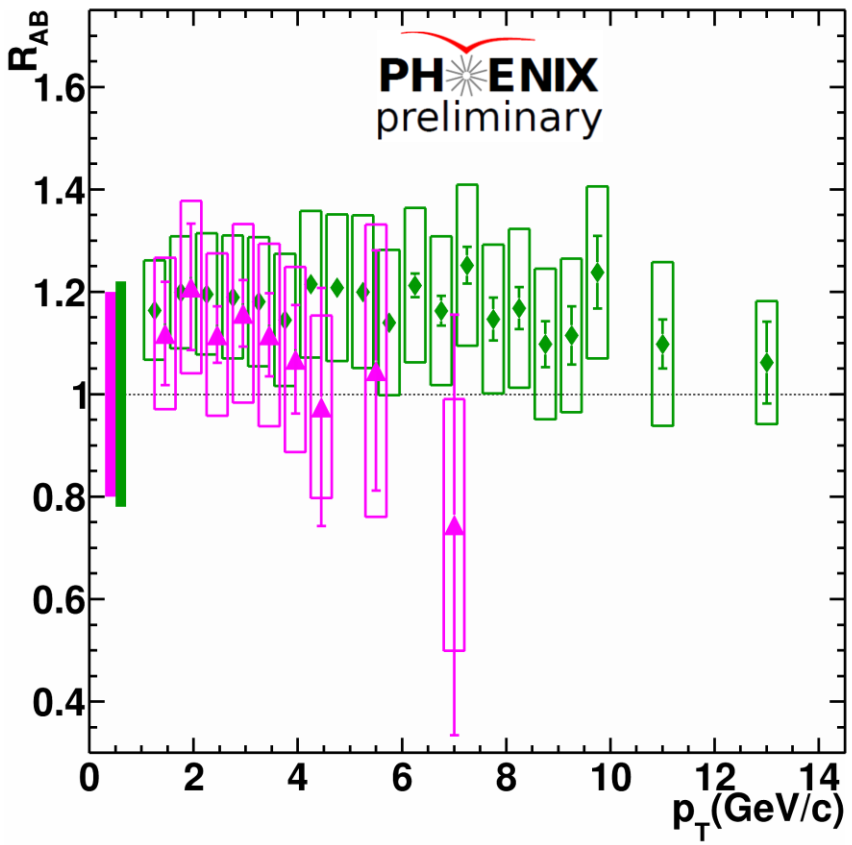
CuAu

In most central collisions φ R_{AB} are less suppressed then π^0 R_{AB} in intermediate p_T range

Most central



Most peripheral



φ

$s\bar{s}$

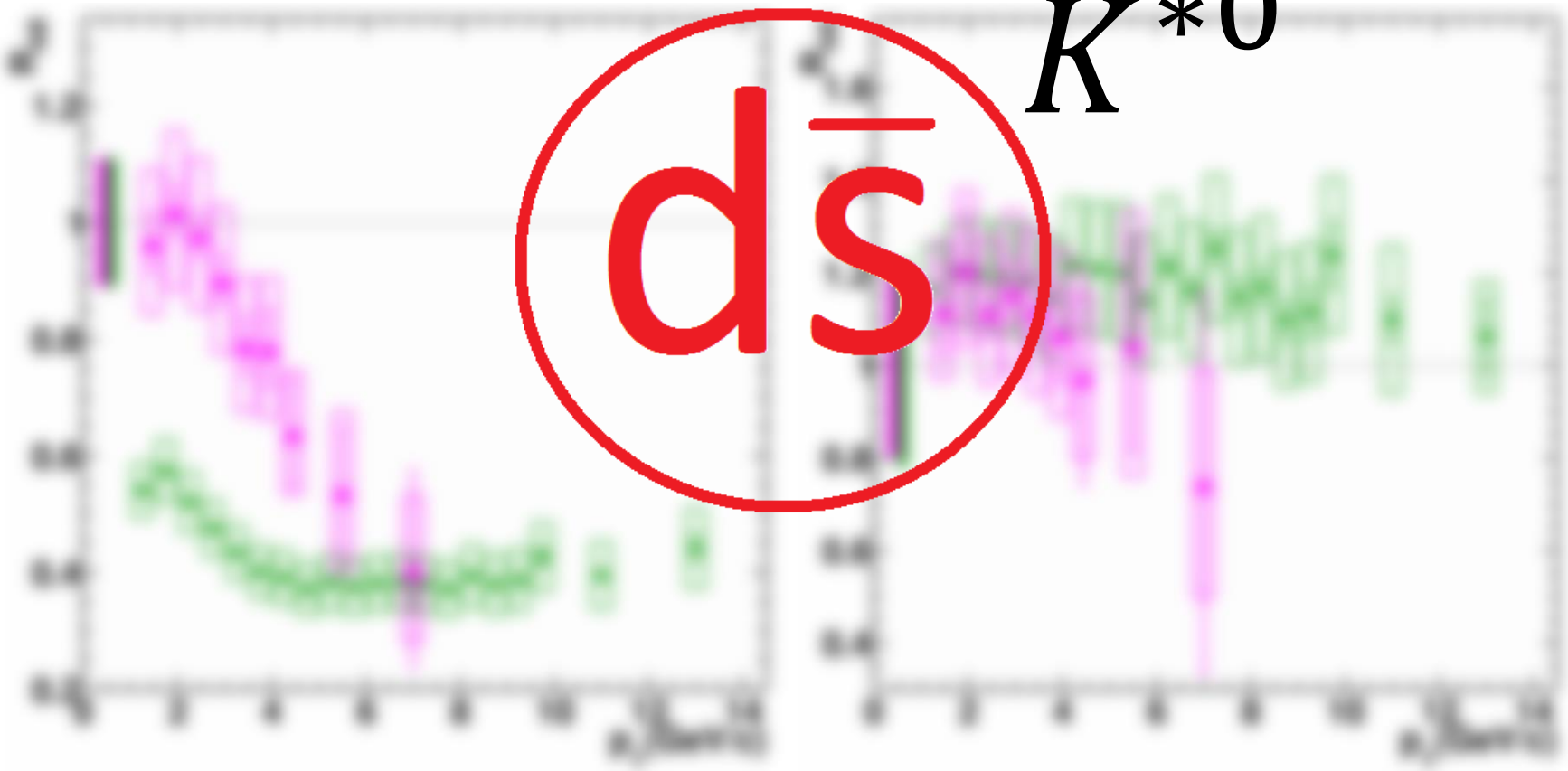
π^0

$\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}$

Motivation

Most central

Most peripheral



K^{*0}

$d\bar{s}$

φ

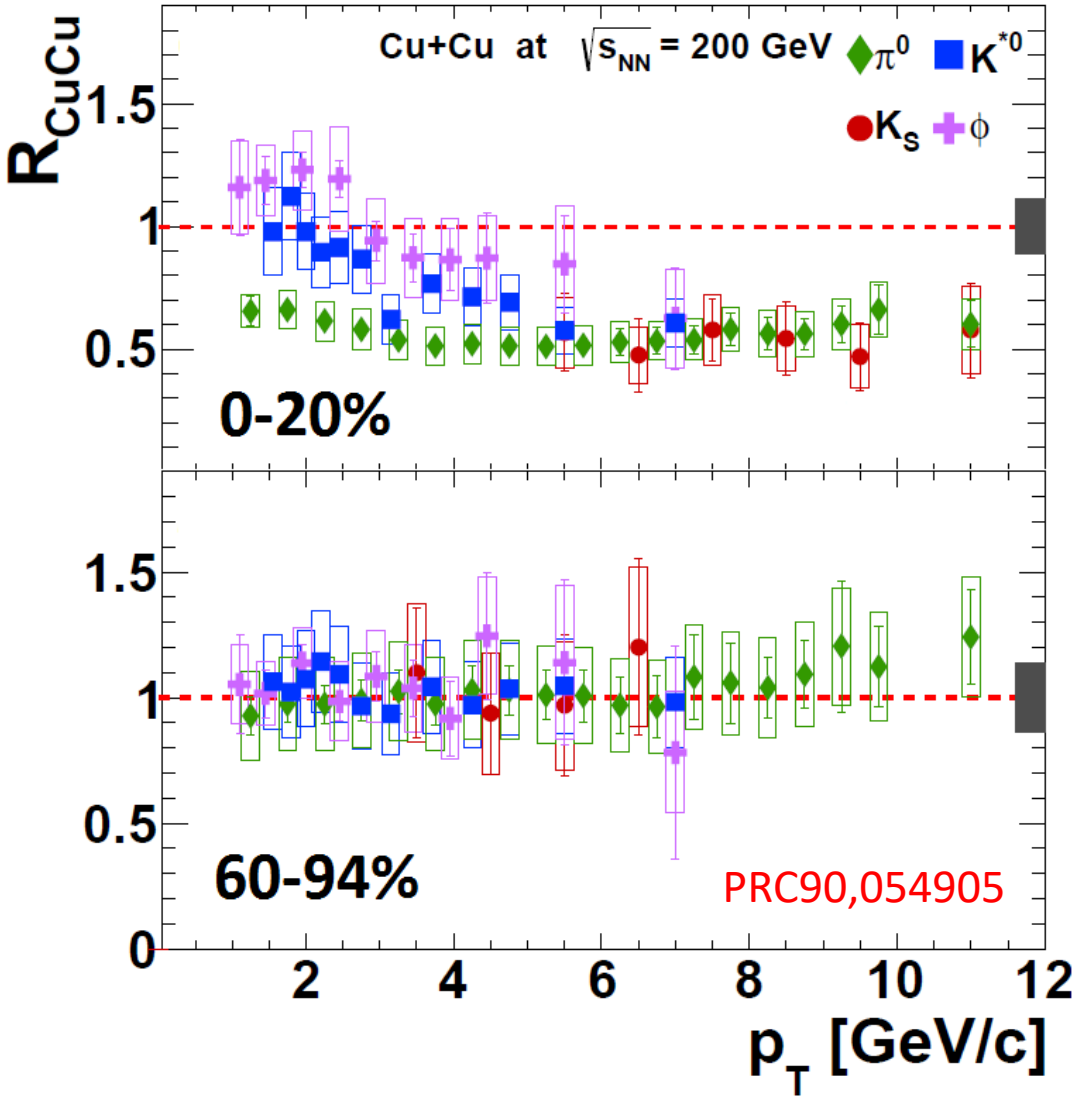
$s\bar{s}$

π^0

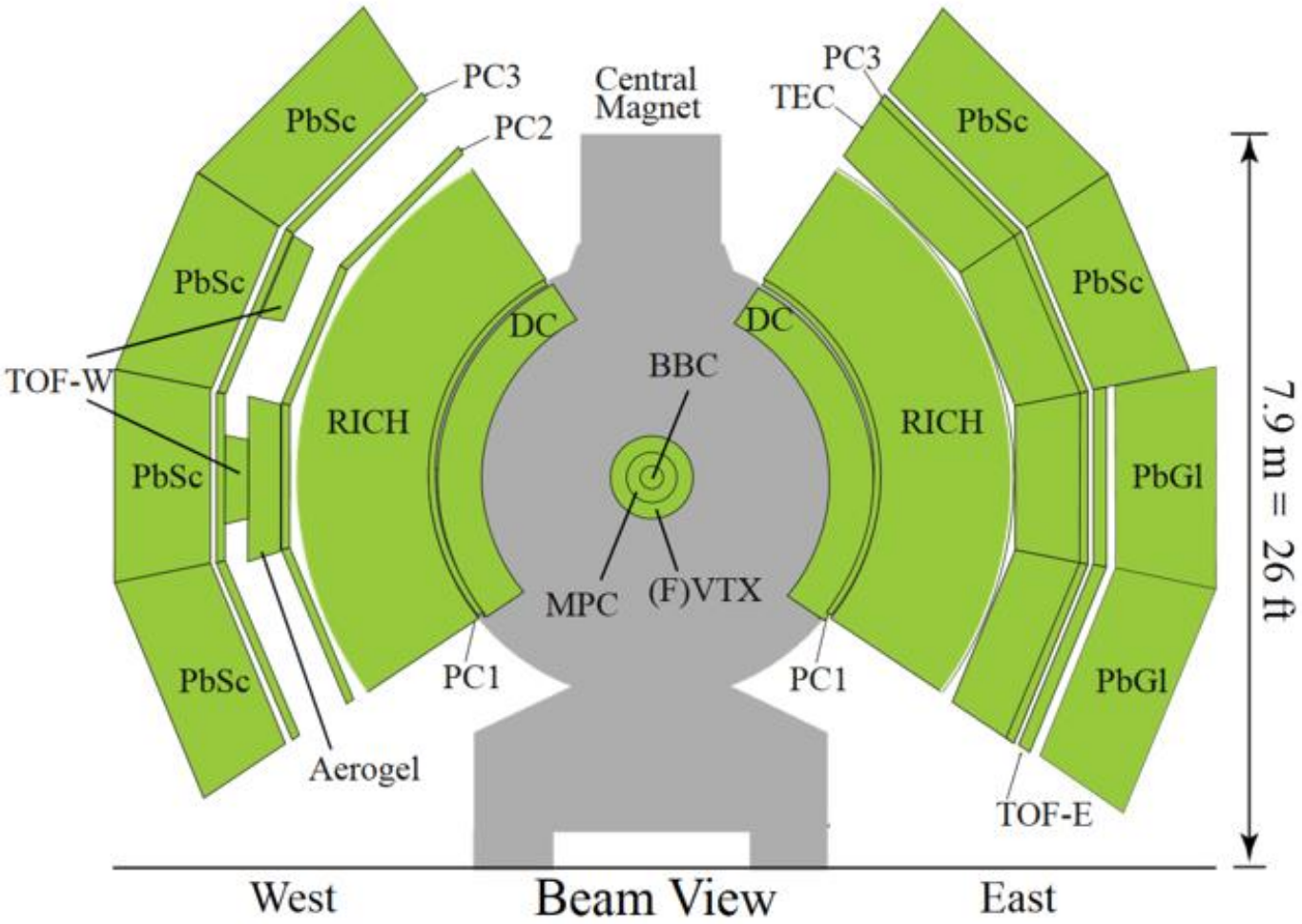
$\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}$

Motivation

K^{*0} -meson production was previously measured by PHENIX in symmetric Cu+Cu collisions at $\sqrt{s_{NN}}$ = 200 GeV

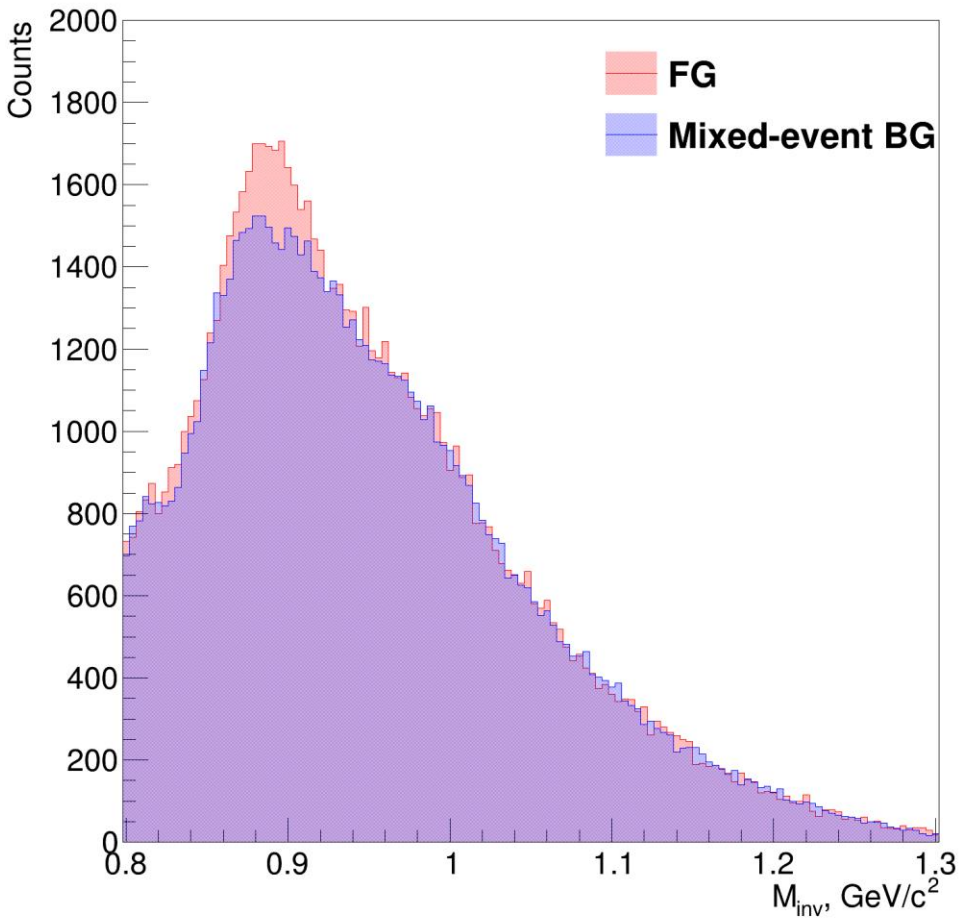


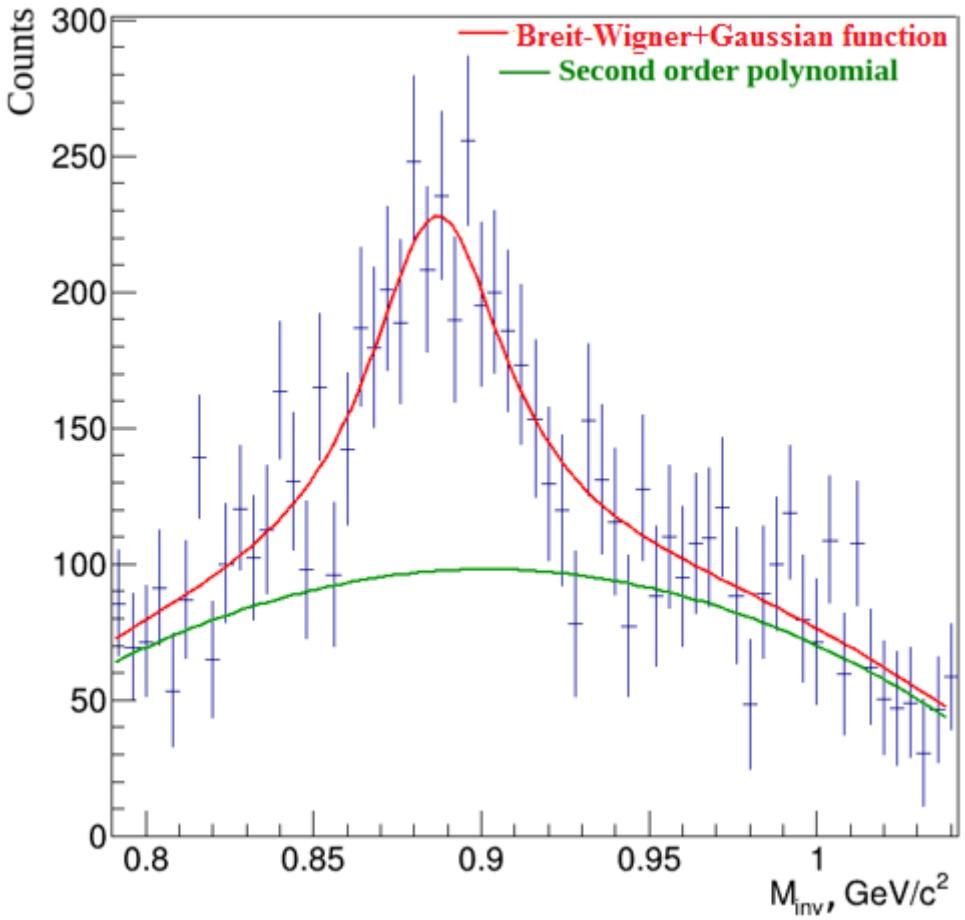
Experiment PHENIX



Raw yield extraction

0-20% centrality bin
$1.80 < p_T < 2.0$ GeV/c

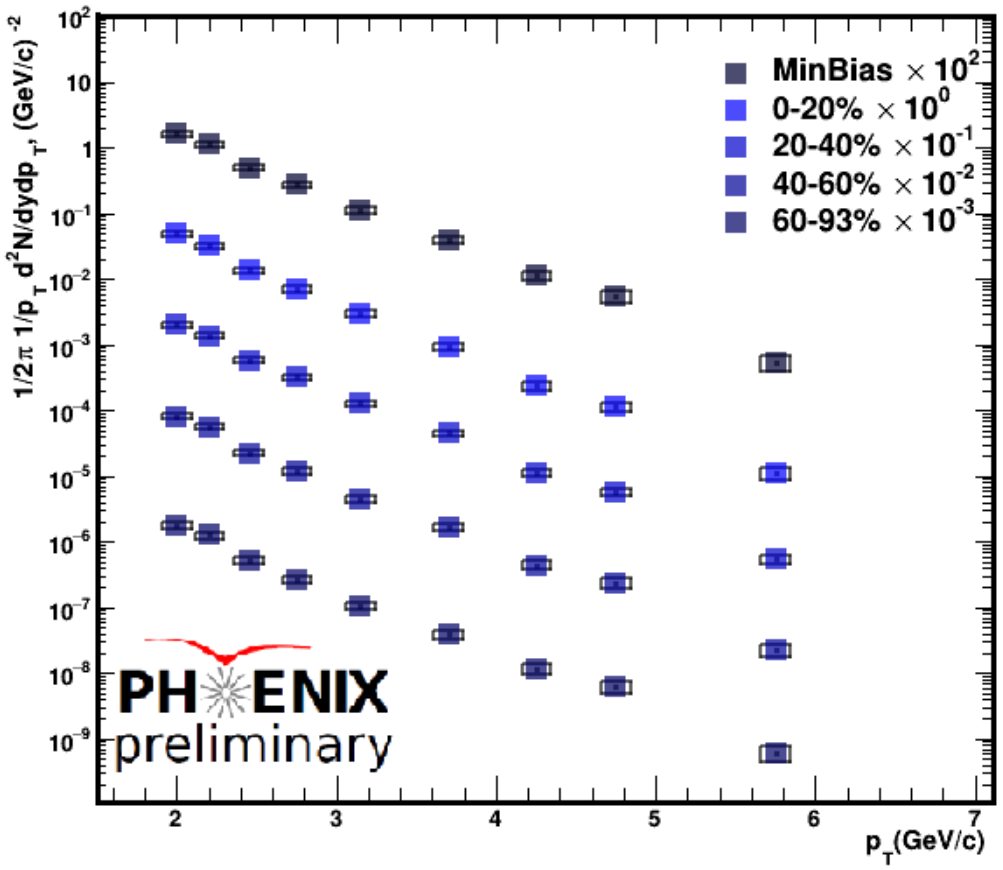




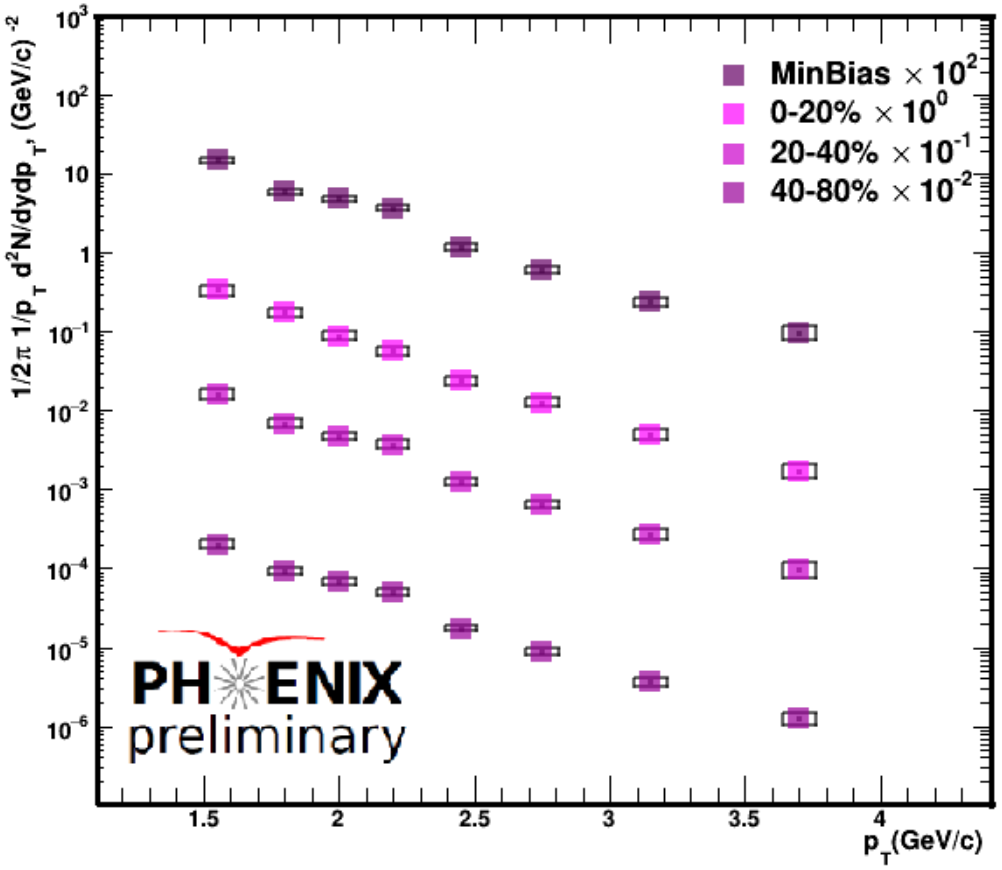
The invariant mass distribution of pairs $K^{\pm}\pi^{\mp}$

Transverse momentum spectra of K^{*0} -meson

CuAu



UU

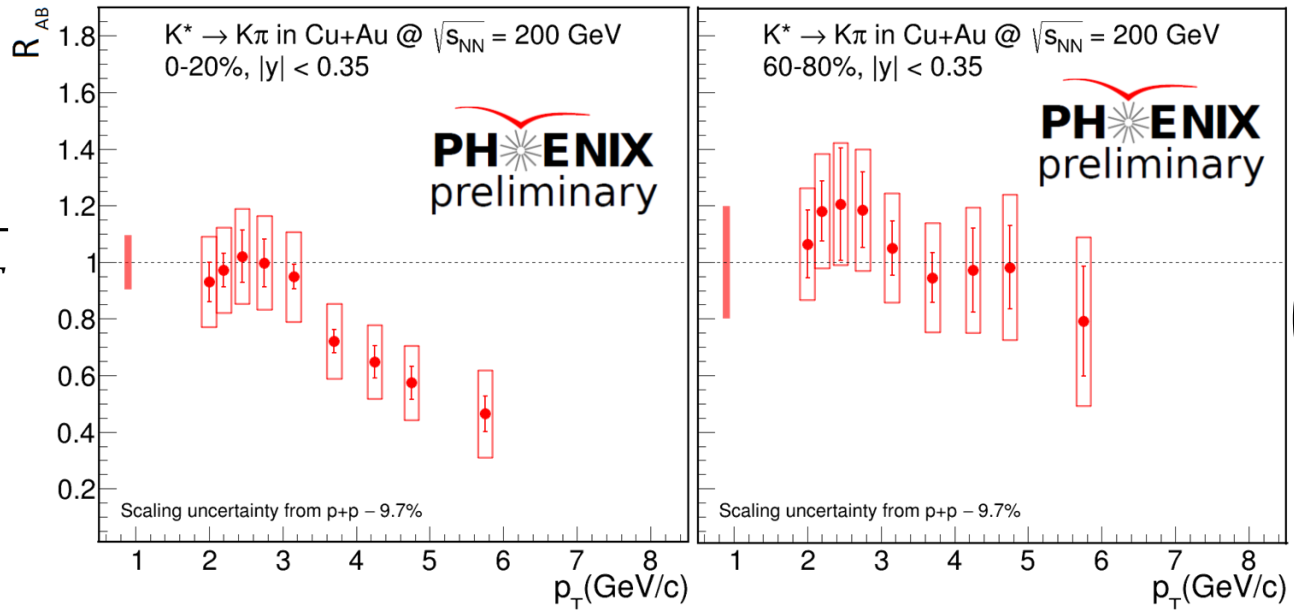


$$\frac{1}{2\pi p_T}\frac{d^2N}{dp_T dy} = \frac{1}{2\pi p_T}\frac{1}{2}\frac{1}{N_{evt}\,Br}\frac{1}{\varepsilon_{eff}(p_T)}\frac{N(\Delta p_T)}{\Delta p_T \Delta y}$$

- $\frac{1}{2}$ points to the average of K^{*0} and $\overline{K^{*0}}$

Nuclear modification factors

$$R_{AB}(p_T) = \frac{d^2N_{AB}(p_T)/dydp_T}{N_{coll}/\sigma_{pp}^{inel} \; * \; d^2\sigma_{pp}/dydp_T}$$



CuAu

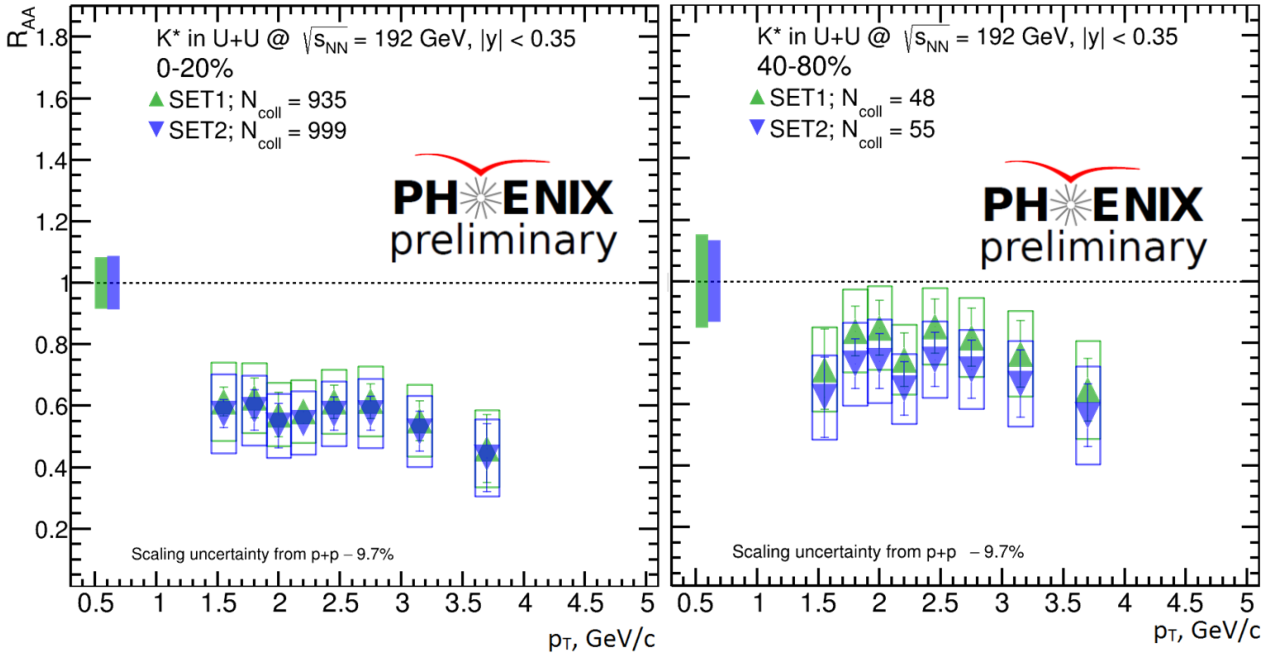
2 set parametrizations are used for U+U collisions

Parameters of the deformed Woods-Saxon distribution

Parameter	SET1	SET2
R(*fm*)	6.81	6.86
a(fm)	0.6	0.42
β_2	0.28	0.265
β_4	0.093	0

N_{coll} for different centralities

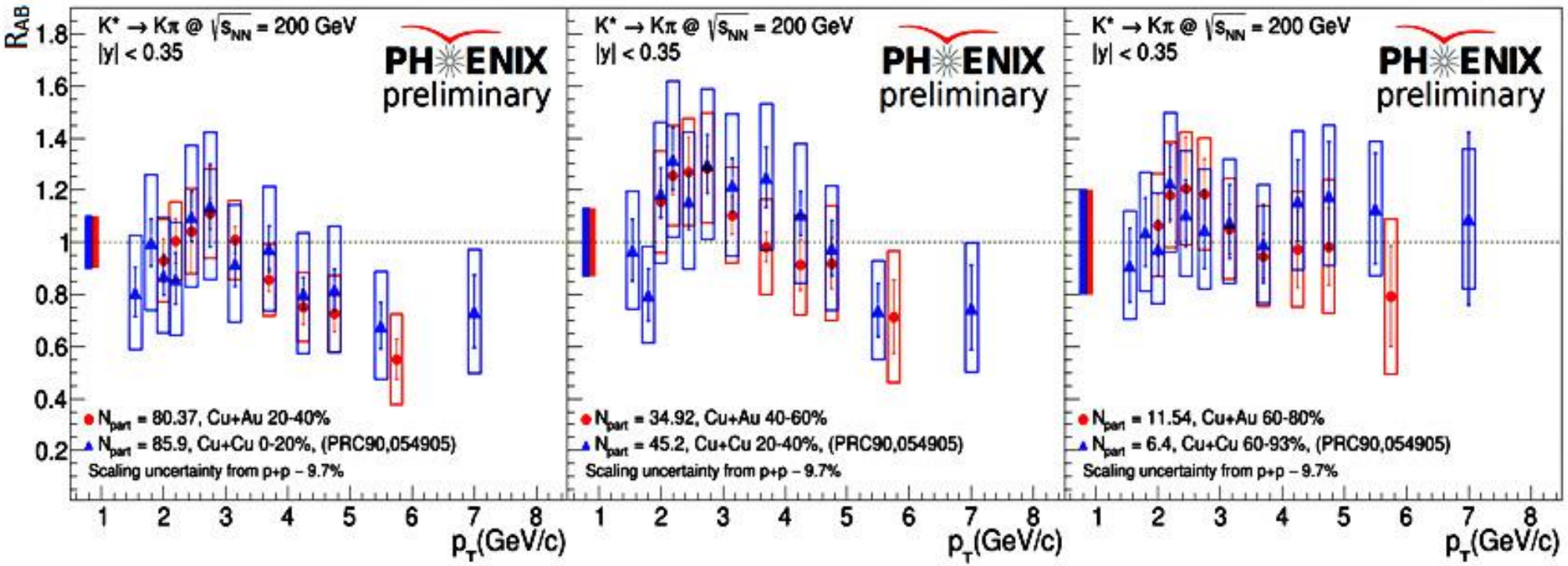
Centrality,%	SET1	SET2
0-20	935±98	999±114
20-40	335±33	375±41
40-80	48±6	55±8
0-80	340±10	376±15



UU

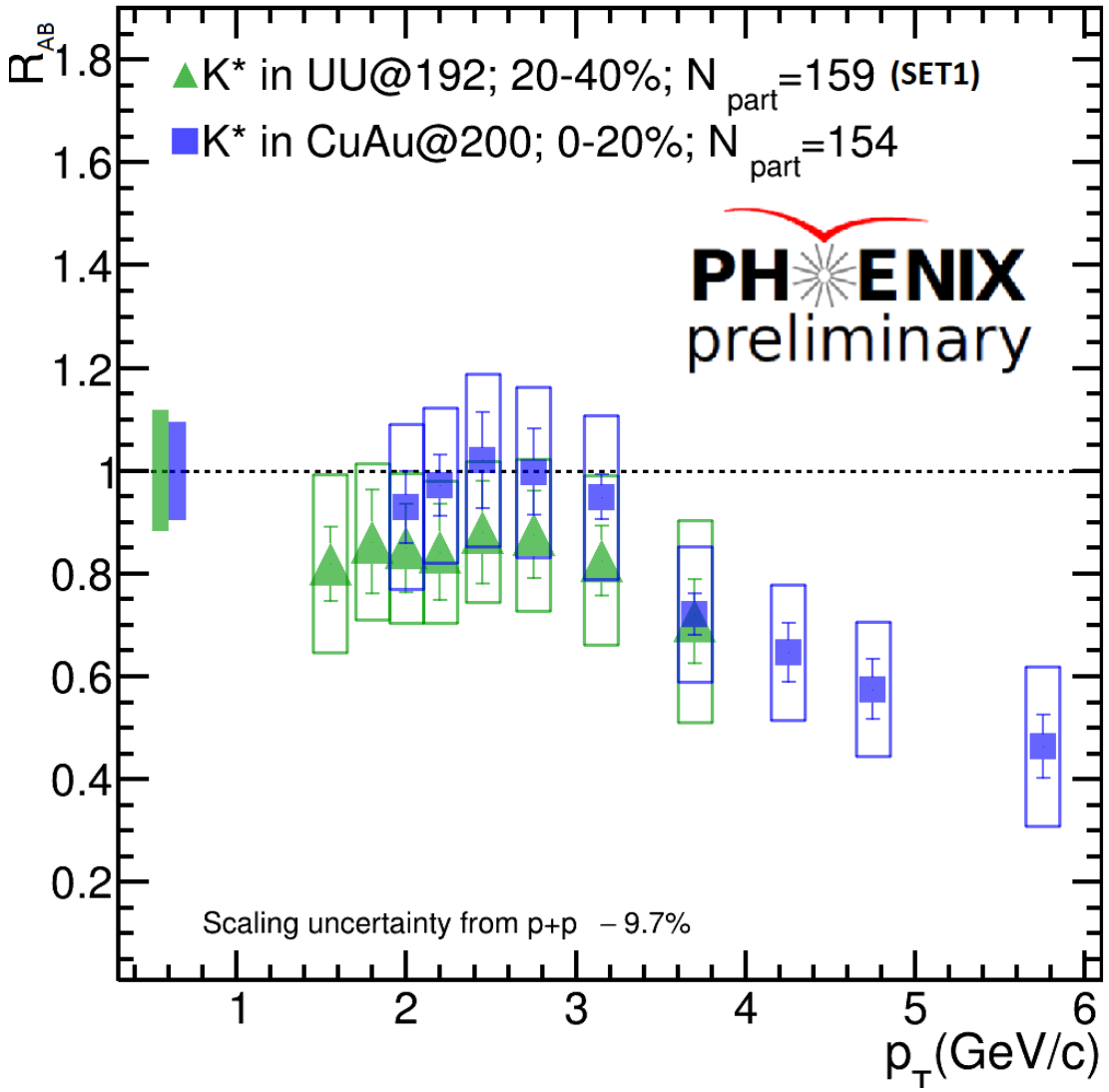
R_{AB} of K^{*0} in Cu+Cu, Cu+Au and U+U collisions

K^{*0} in CuCu (PRC90,054905)



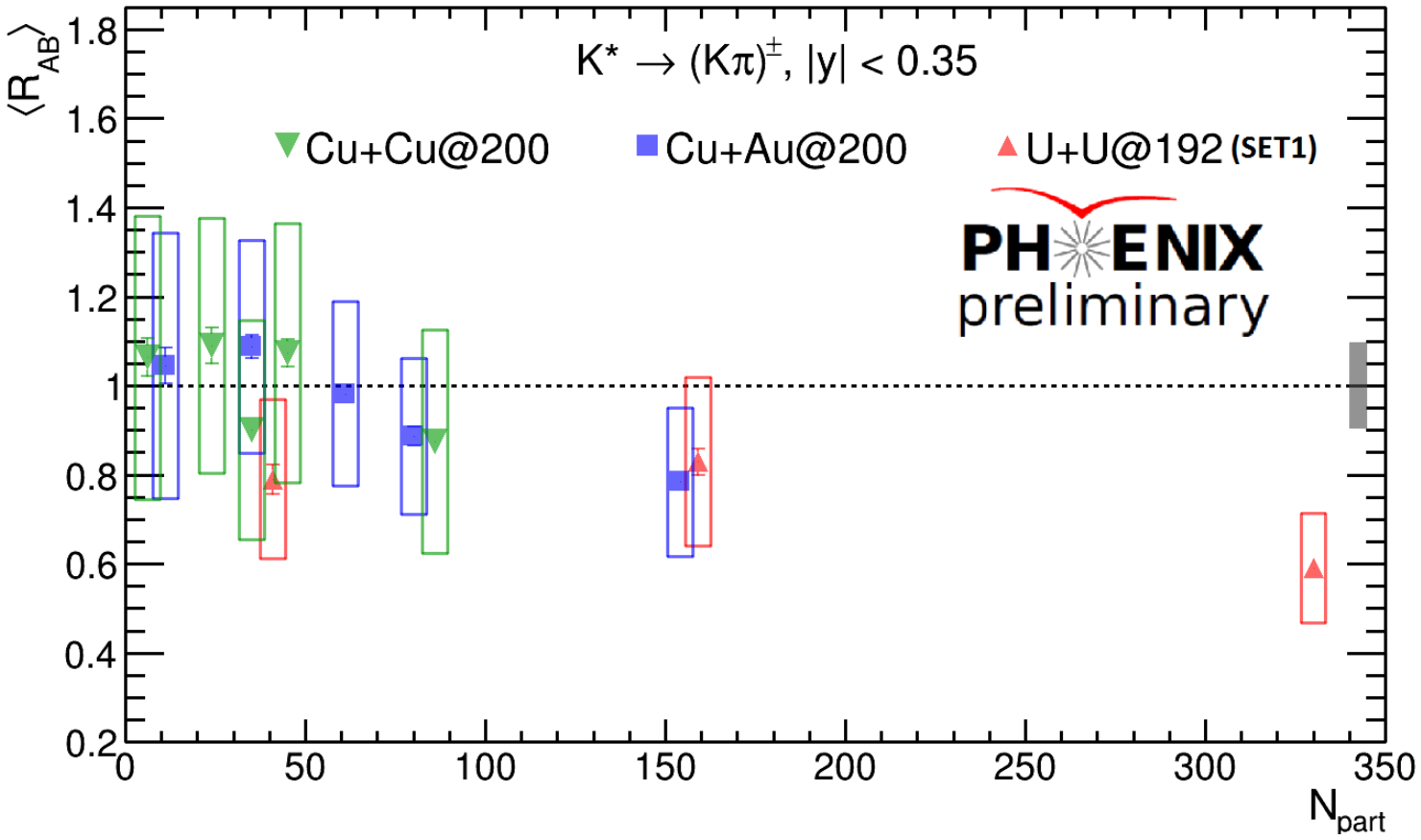
R_{AB} of K^{*0} in Cu+Cu and Cu+Au collisions are in a good agreement at similar number of participants

R_{AB} of K^{*0} in Cu+Cu, Cu+Au and U+U collisions



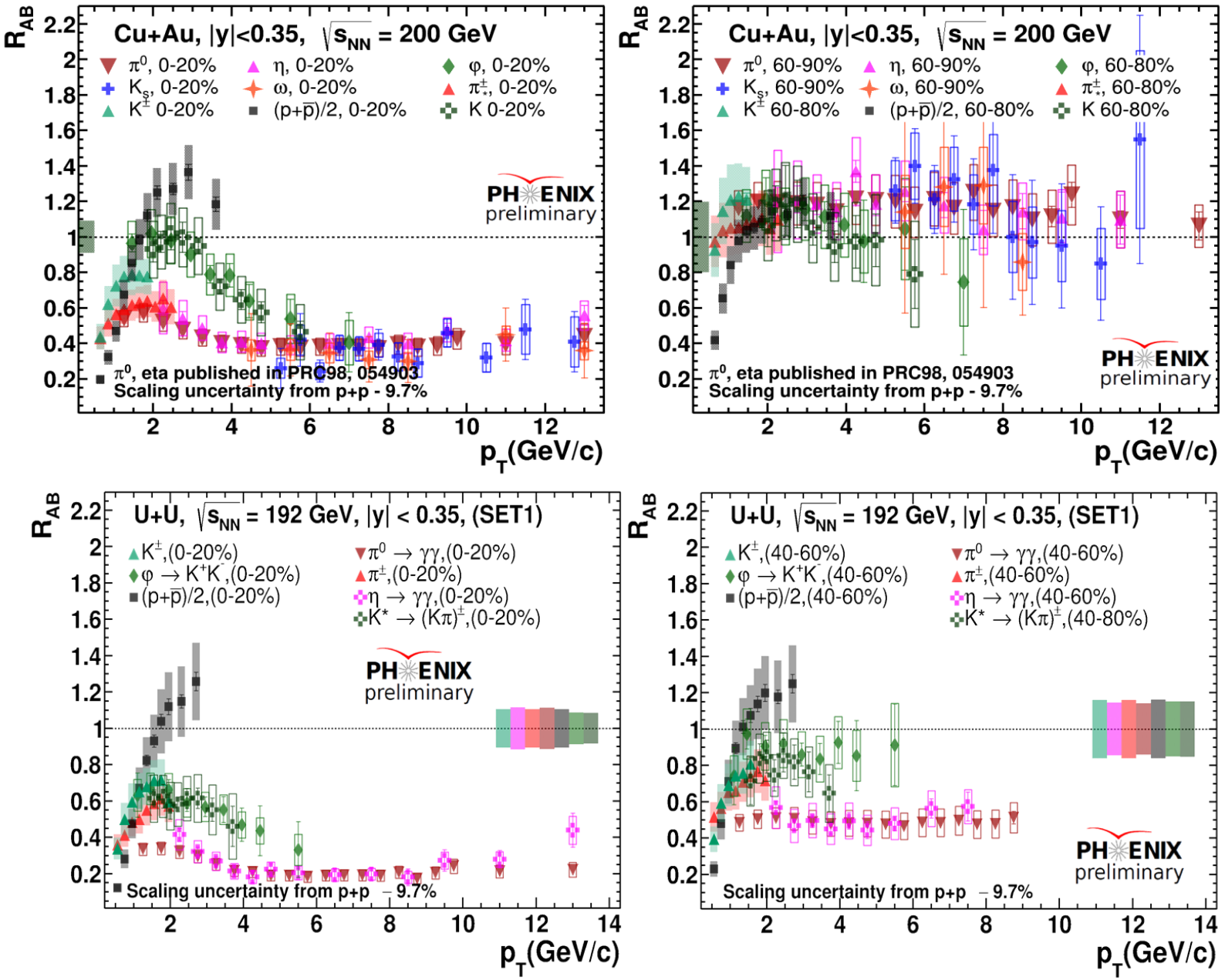
R_{AB} of K^{*0} in Cu+Au and U+U collisions are in a good agreement at similar number of participants

$\langle R_{AB} \rangle$ of K^{*0} in Cu+Cu, Cu+Au and U+U collisions



Production and suppression of the K^{*0} -meson seem to depend on nuclear overlap size, but not on its geometry

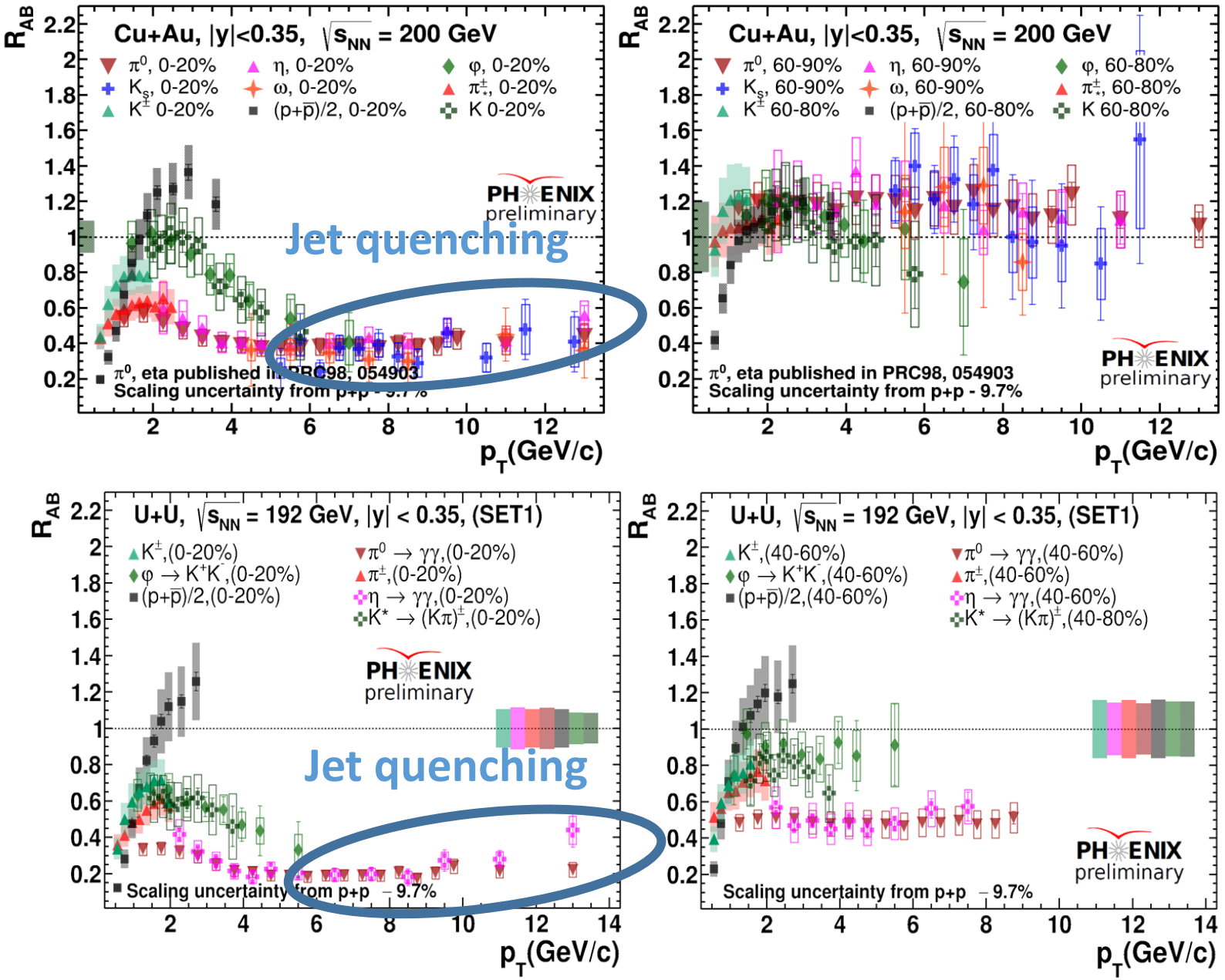
R_{AB} of hadrons in Cu+Au and U+U collisions



CuAu

UU

R_{AB} of hadrons in Cu+Au and U+U collisions



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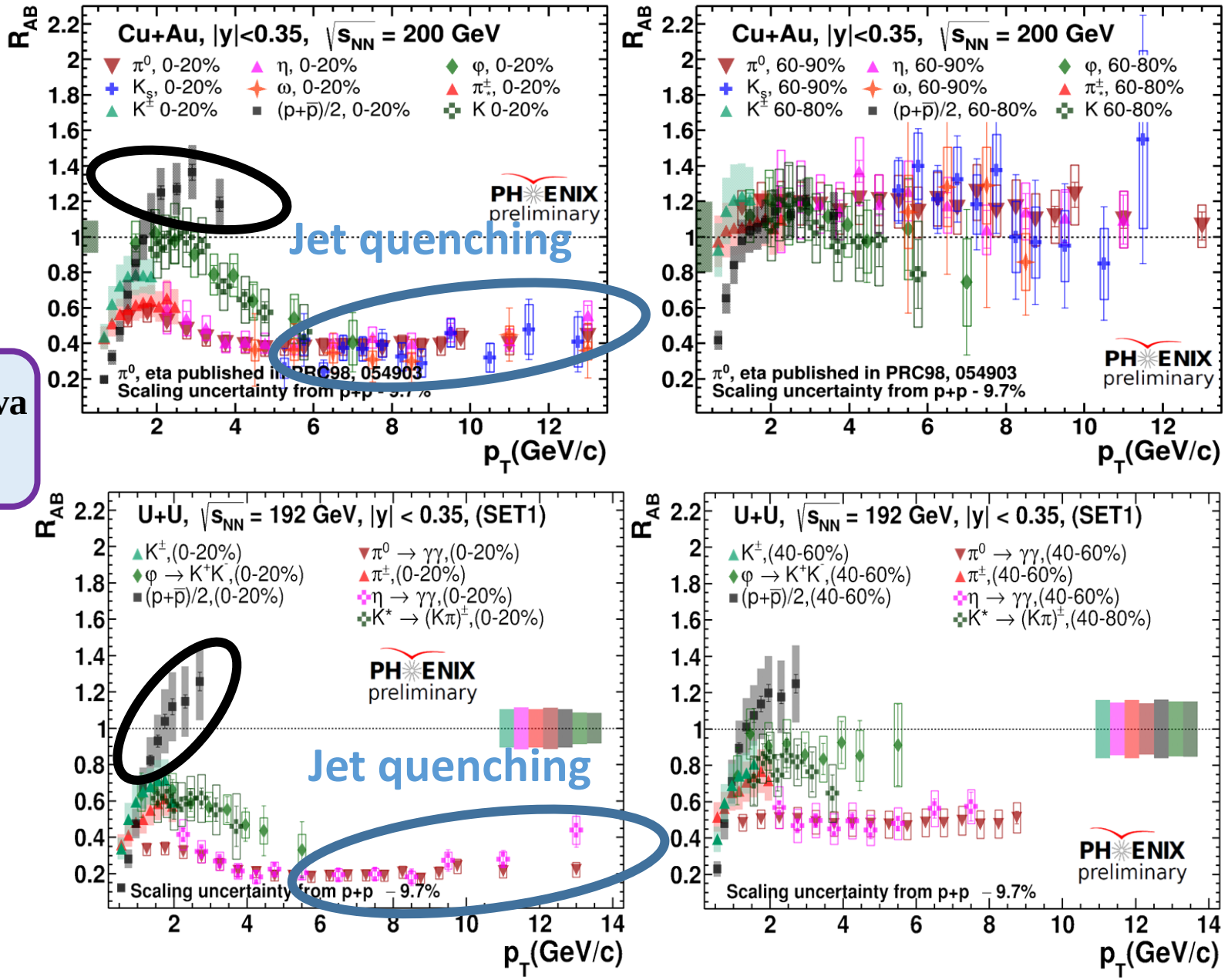
R_{AB} of hadrons in Cu+Au and U+U collisions

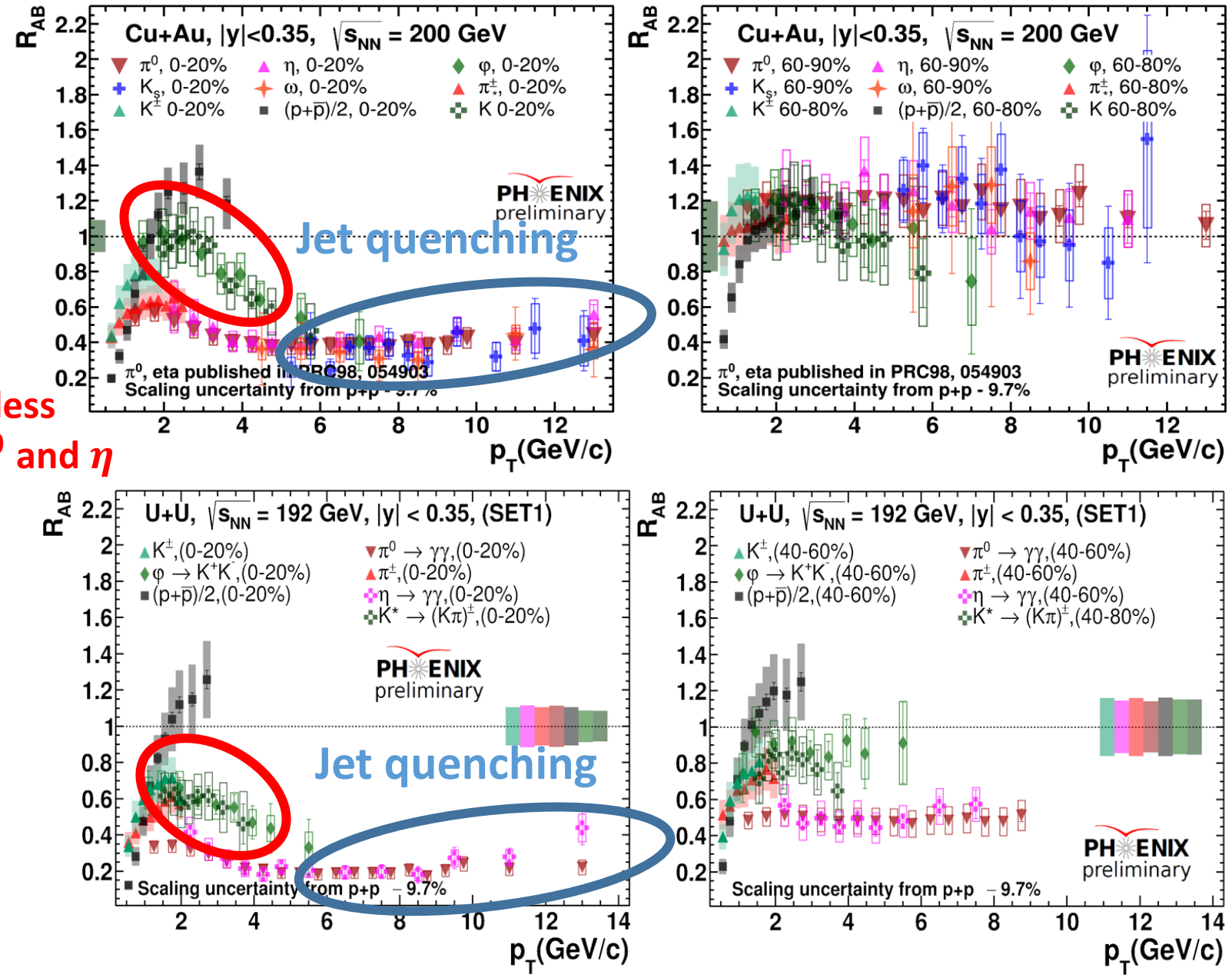


Talk by D. Larionova "barion puzzle "

CuAu

UU

R_{AB} of hadrons in Cu+Au and U+U collisions



K^{*0} and φ are less suppressed the π^0 and η

CuAu

UU

Conclusion

- ✓The K^{*0} and φ mesons R_{AB} exhibit similar shape in all centralities in whole p_T range.
- ✓In most central collisions the K^{*0}-meson is less suppressed than π^0 and η in the intermediate p_T (2< p_T<5 GeV/c) range whereas at higher p_T (p_T>5 GeV/c), K^{*0}, π^0 and η show similar suppression values.
- ✓In peripheral collision light hadron R_{AB} shows similar suppression values.
- ✓The K^{*0} -meson nuclear modification factors in Cu+Cu, Cu+Au, and U+U collisions for similar N_{part} values exhibit similar shape.
  - ➢ Production and suppression of the K^{*0} -meson seem to depend on nuclear overlap size, but not on its geometry.

Thank you for attention!