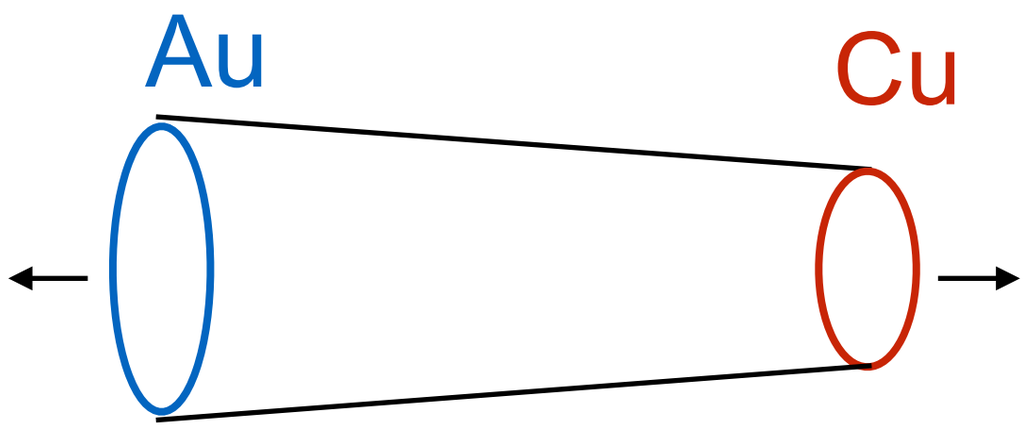
Forward/Backward asymmetry of v_n in Cu+Au at PHENIX

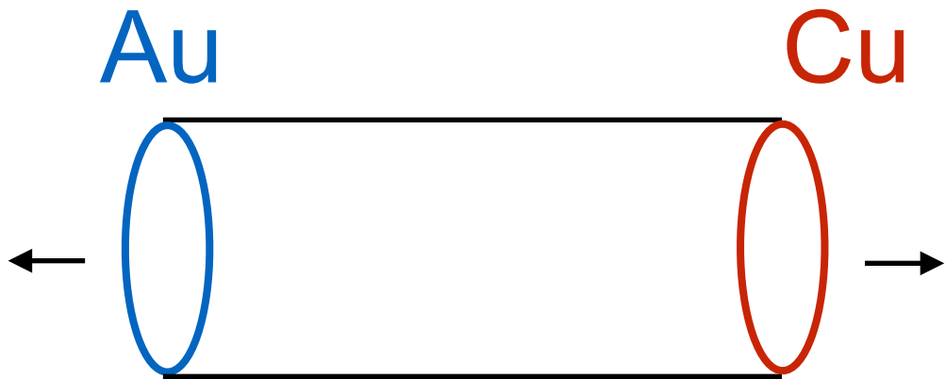
Hiroshi Nakagomi for the PHENIX Collaboration

Asymmetric initial eccentricity



?

Boost invariance initial eccentricity



Rapidity asymmetric initial eccentricity ?

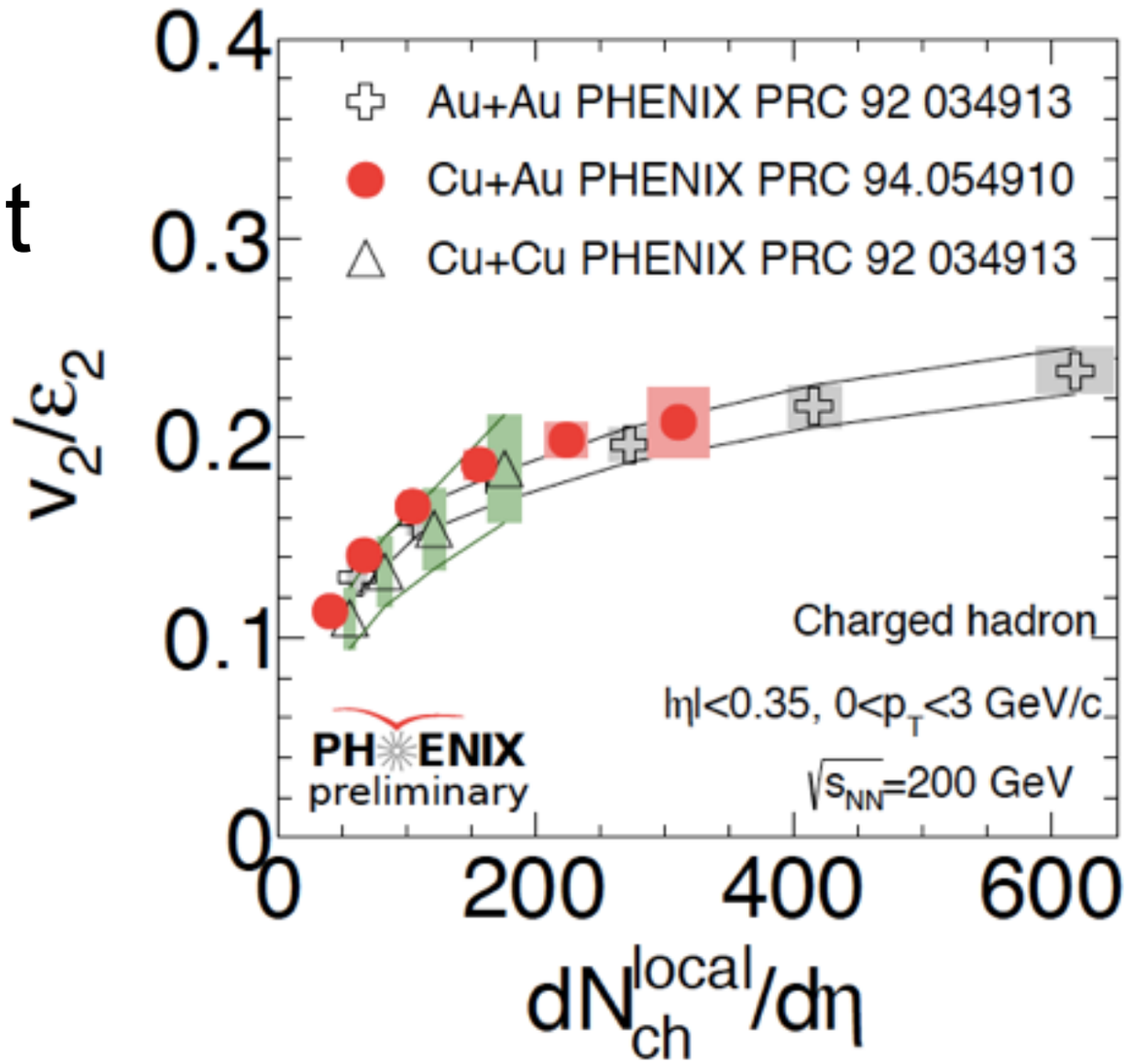
or

Rapidity symmetric initial eccentricity ?

How to study initial eccentricity?

Empirical relation among v_2 , ε_2 and dN/dη in different collision systems

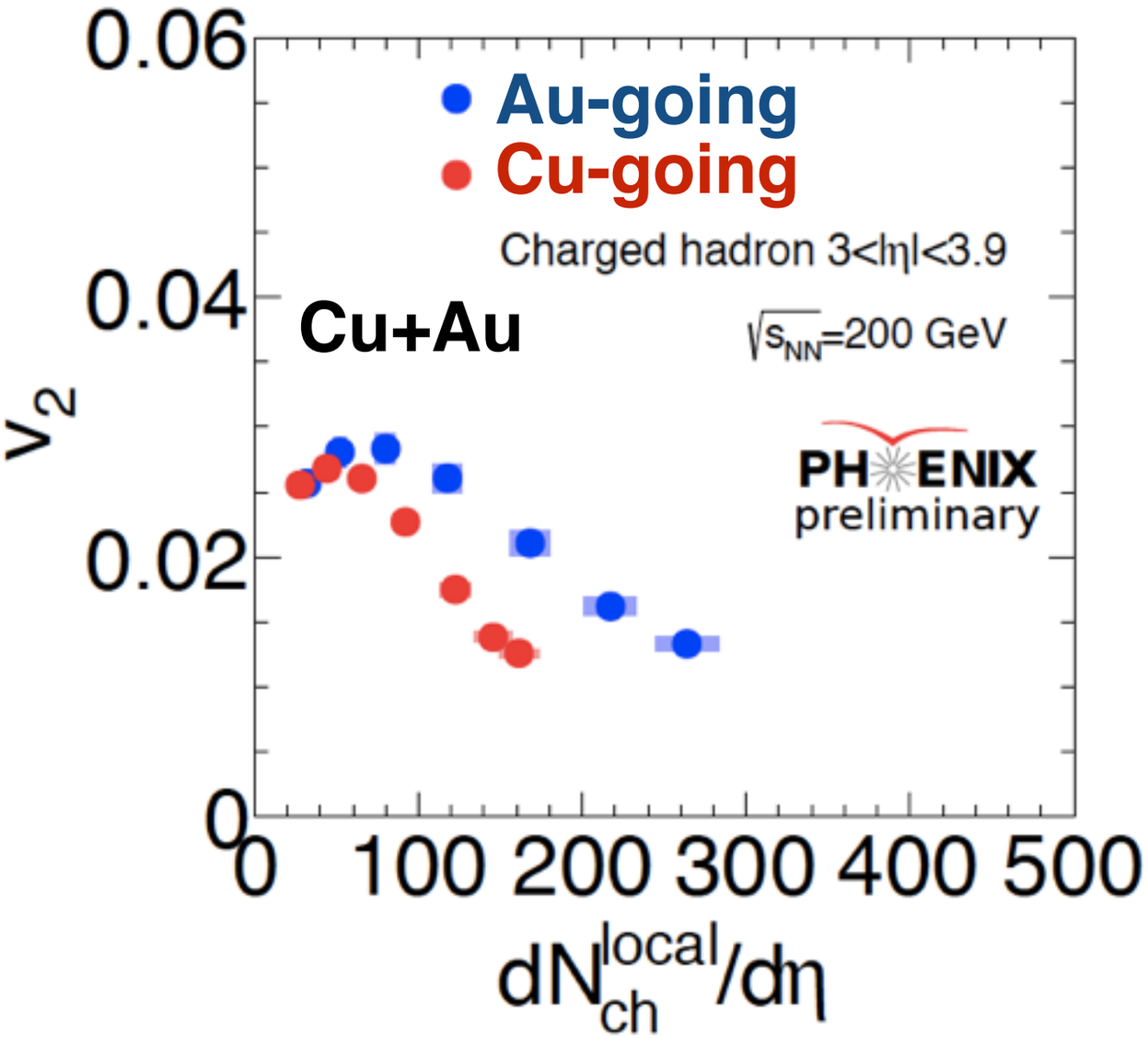
$v_2/\varepsilon_2 \propto f(dN/d\eta)$

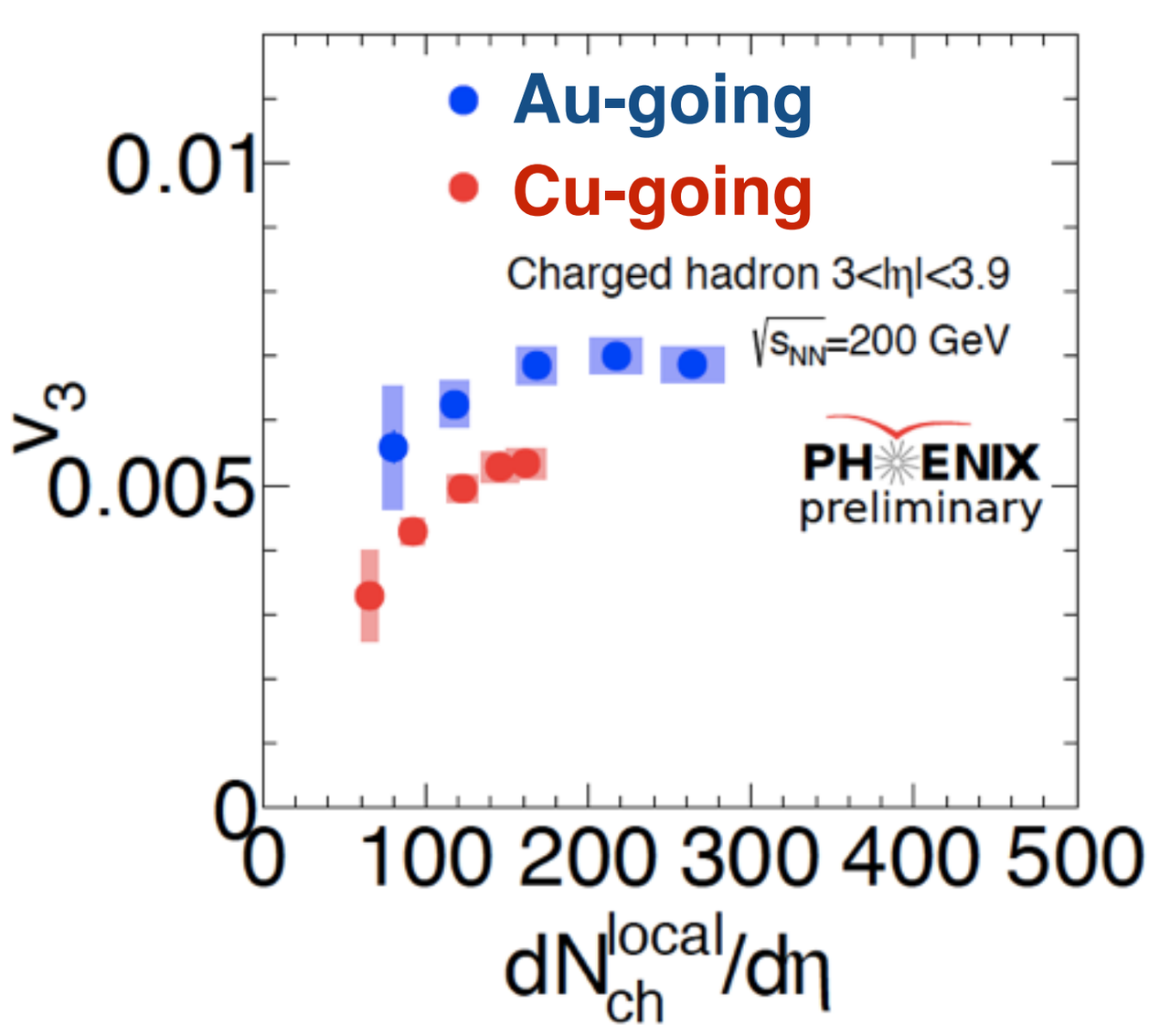


At mid-rapidity, v_2/ε_2 works well !

Does this relation work for F/B rapidity ?

Forward/Backward v_n vs $dN_{ch}/d\eta$





F/B v_n plotted as a function of F/B $dN_{ch}/d\eta$(energy density)

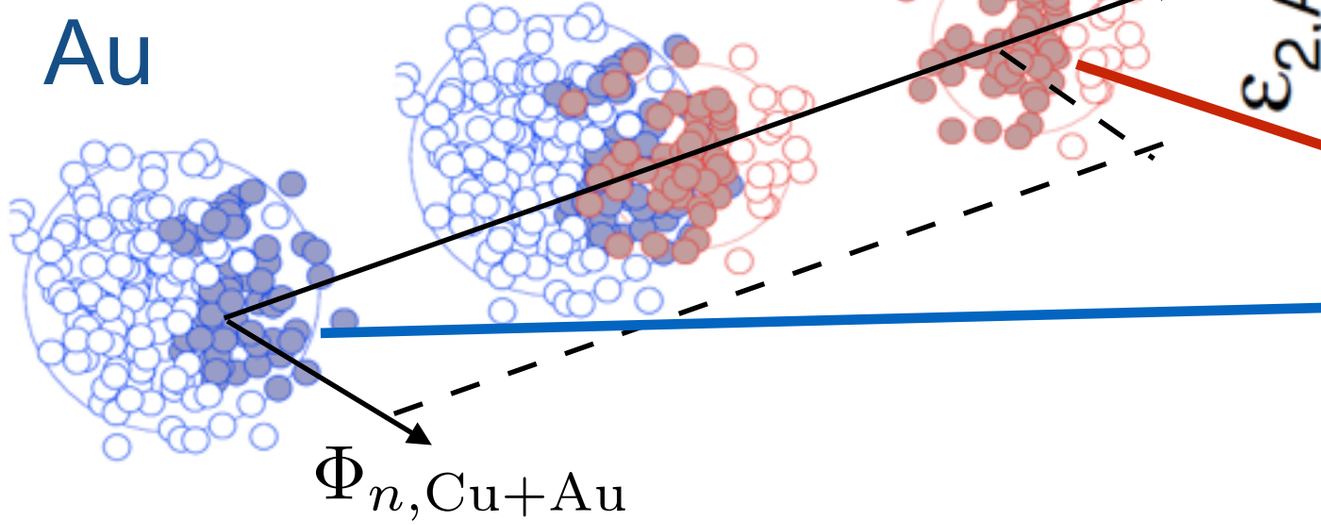
Au-going v_n ($dN_{ch}/d\eta$) > Cu-going v_n ($dN_{ch}/d\eta$)

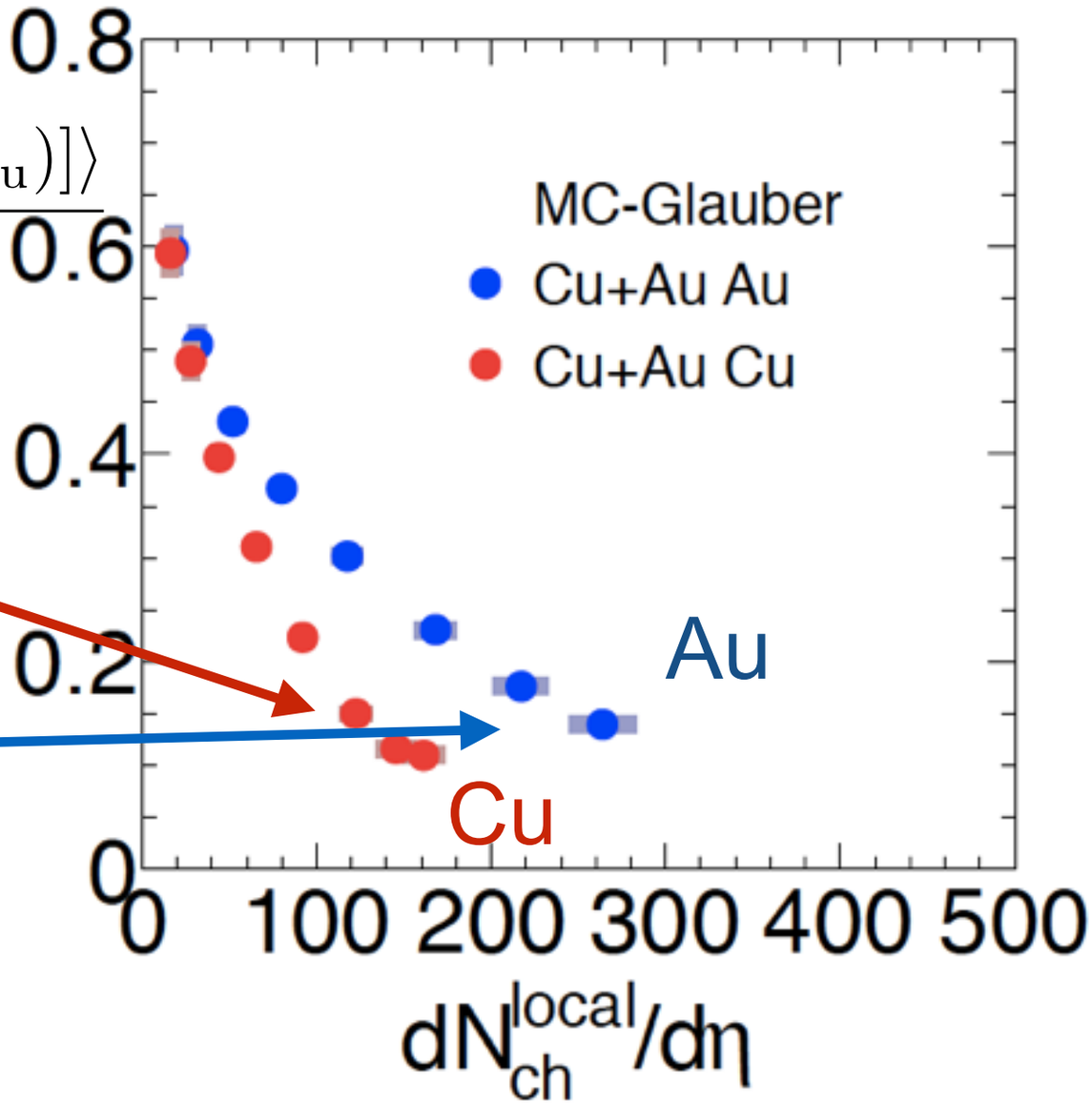
- Caused by initial eccentricity?

ε_n : Asymmetric initial eccentricity

MC-Glauber model

$$\varepsilon_{n,\mathrm{Au(Cu)}} = \frac{\langle r^n \cos[n(\phi_{\mathrm{Au(Cu)}} - \Phi_{n,\mathrm{Cu+Au}})]\rangle}{\langle r^n \rangle}$$





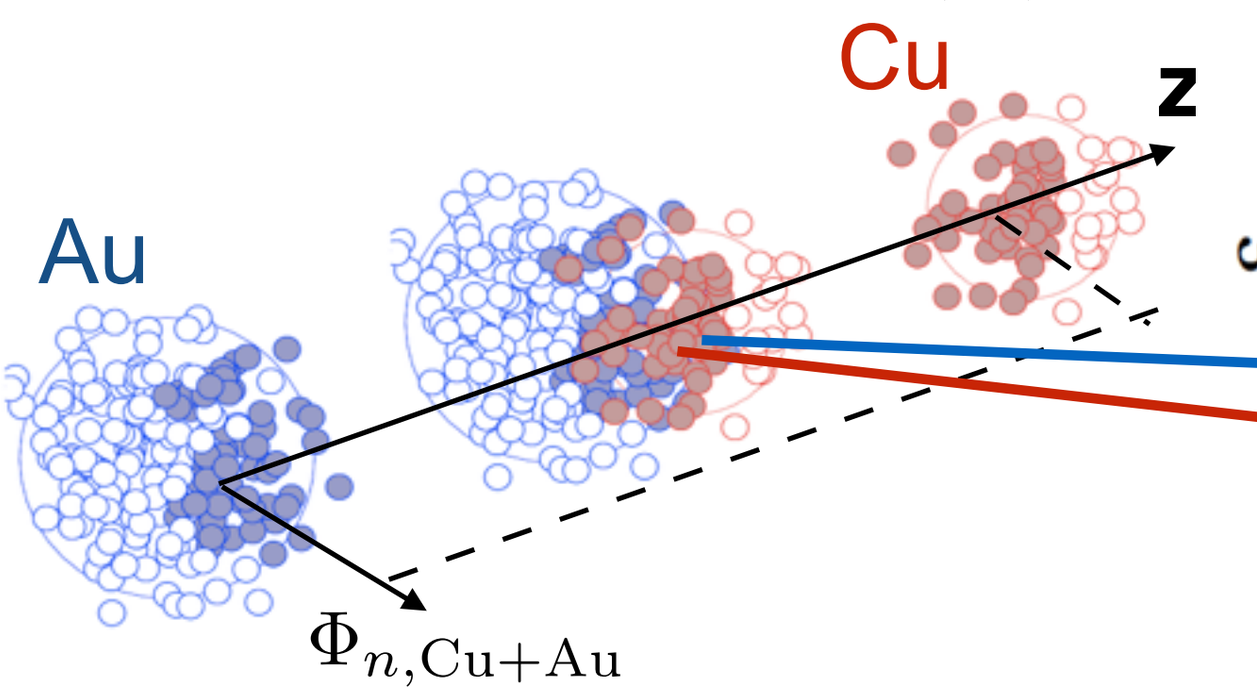
$\varepsilon_{n,\,Au}$: Au participant eccentricity

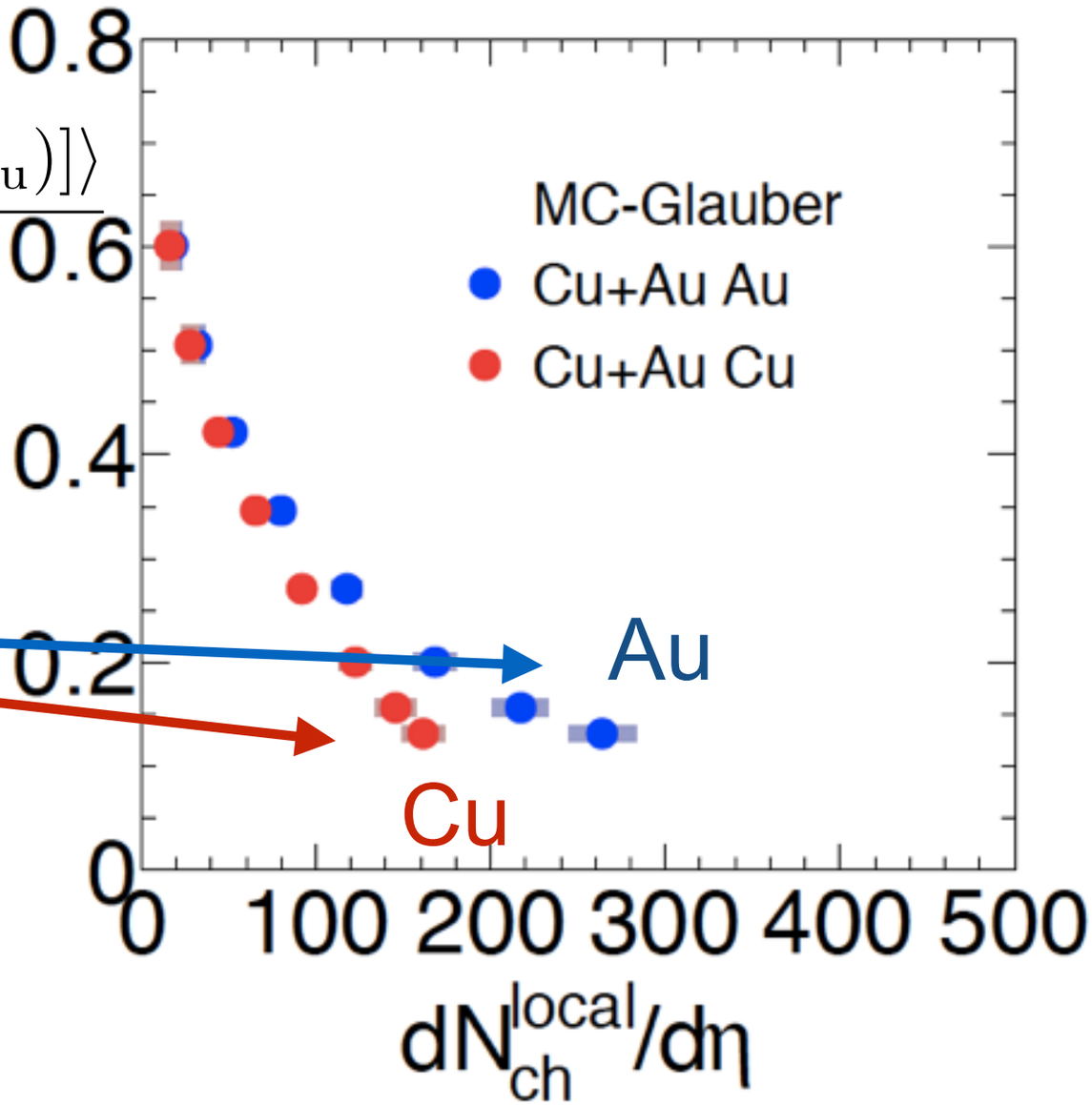
$\varepsilon_{n,\,Cu}$: Cu participant eccentricity

ε_n :Symmetric initial eccentricity

MC-Glauber model

$$\varepsilon_{n,\mathrm{Au(Cu)}} = \frac{\langle r^n \cos[n(\phi_{\mathrm{Au(Cu)}} - \Phi_{n,\mathrm{Cu+Au}})]\rangle}{\langle r^n \rangle}$$





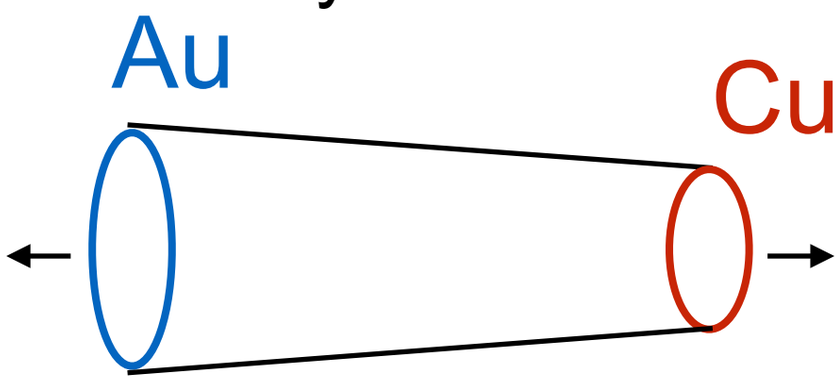
$\varepsilon_{n,\ \mathrm{Cu+Au}}$: Cu+Au participant eccentricity

$\varepsilon_{n,\ \mathrm{Cu+Au}}$: Cu+Au participant eccentricity

v_n/ε_n : Asymmetric initial eccentricity

Initial eccentricity

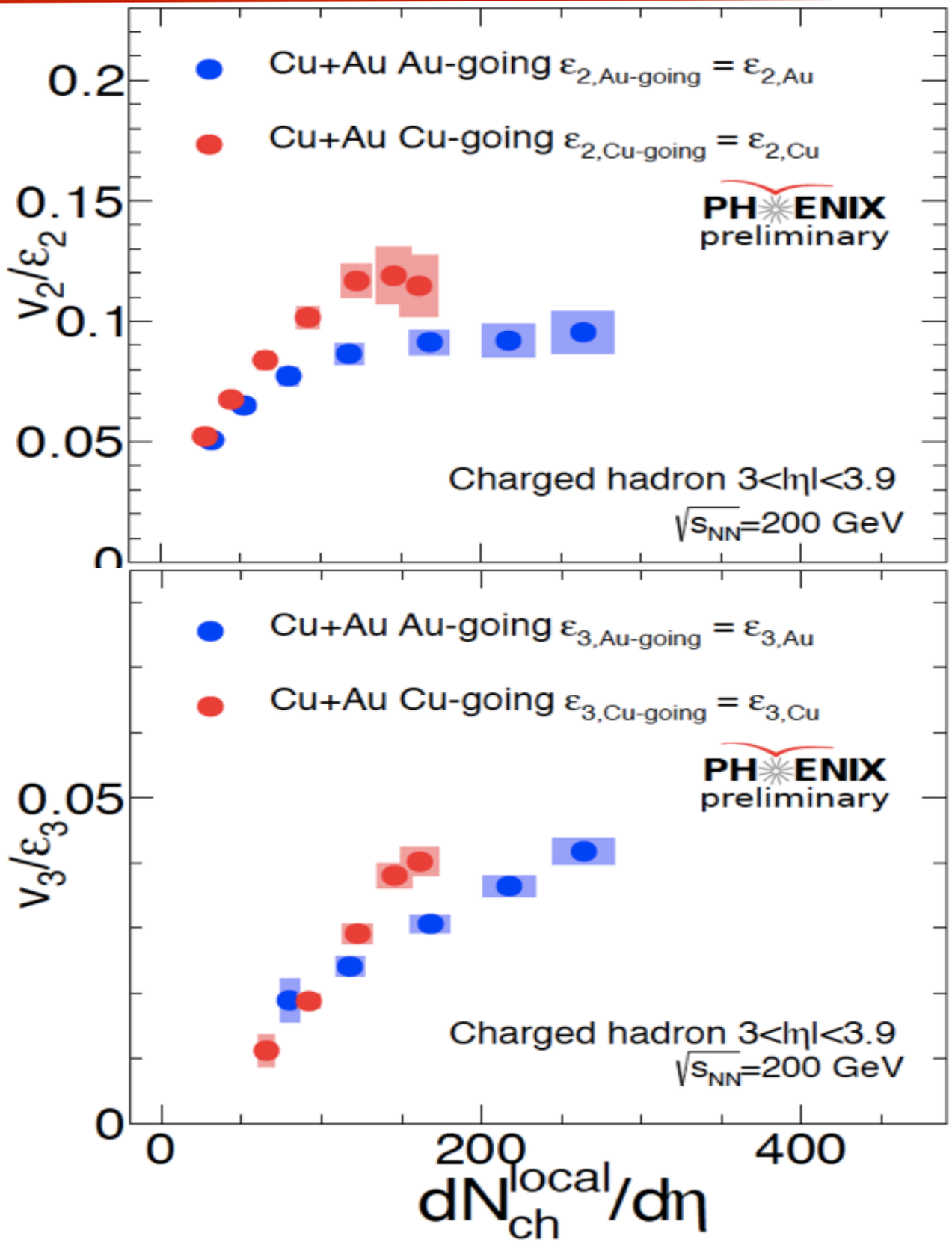
Asymmetric



$v_{n,\text{ Au-going}}/\varepsilon_{n,\text{Au}}$

$\neq$

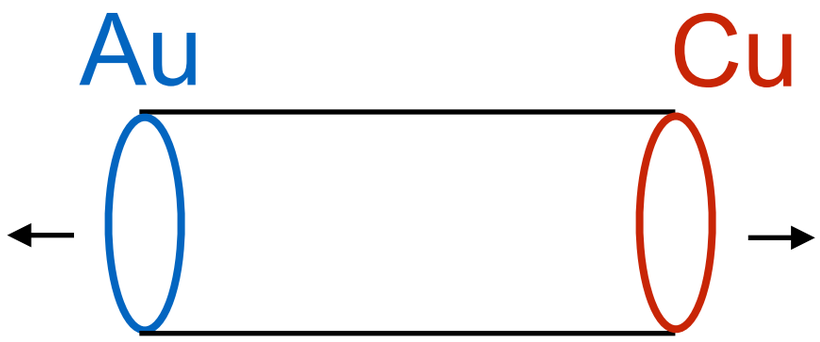
$v_{n,\text{ Cu-going}}/\varepsilon_{n,\text{Cu}}$



v_n/ε_n : Symmetric initial eccentricity

Initial eccentricity

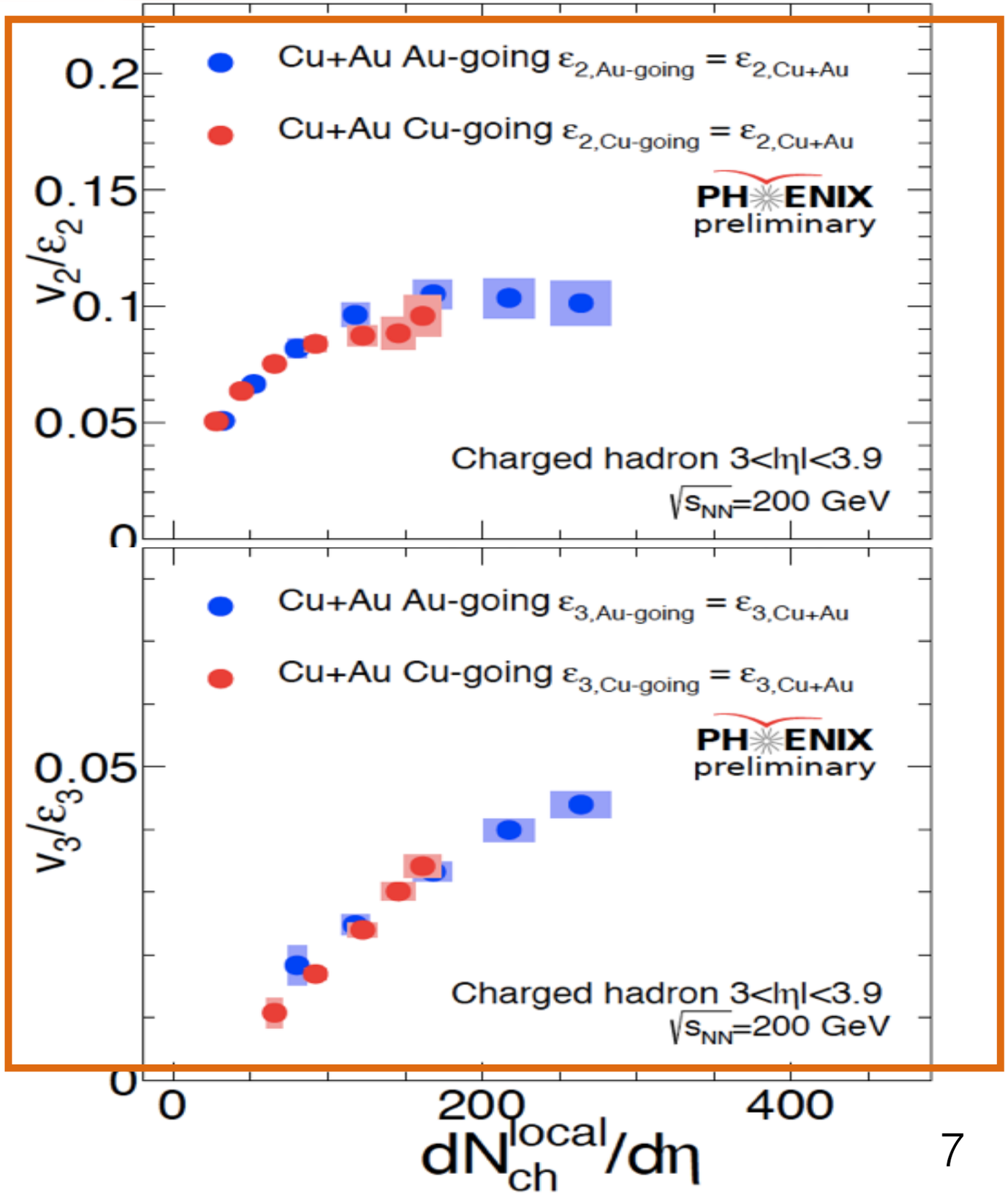
Symmetric



$v_{n,\text{ Au-going}}/\varepsilon_{n,\text{Cu+Au}}$

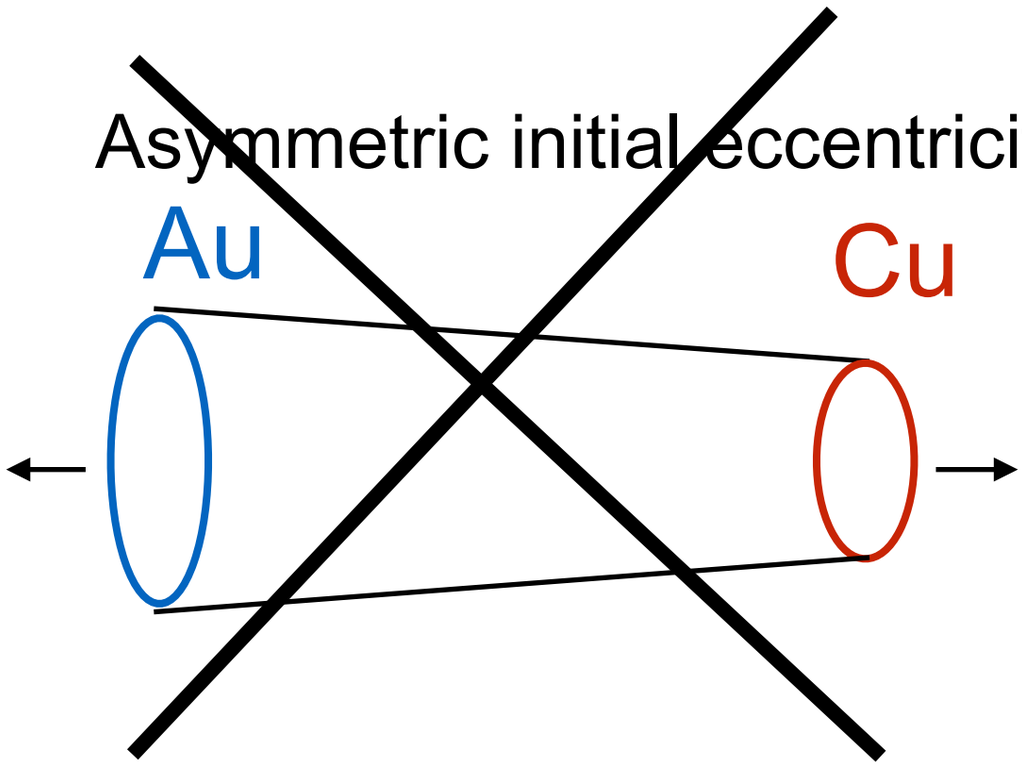
=

$v_{n,\text{ Cu-going}}/\varepsilon_{n,\text{Cu+Au}}$

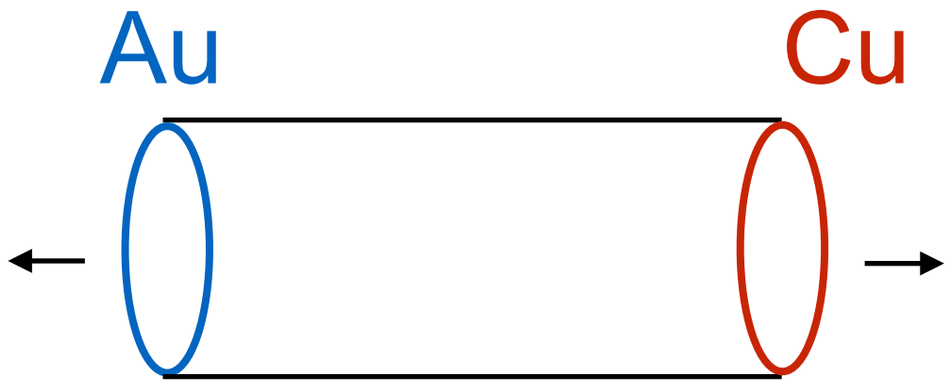


Initial geometry seems to be identical between forward and backward rapidity

Asymmetric initial eccentricity



Boost invariance initial eccentricity



Thank you!