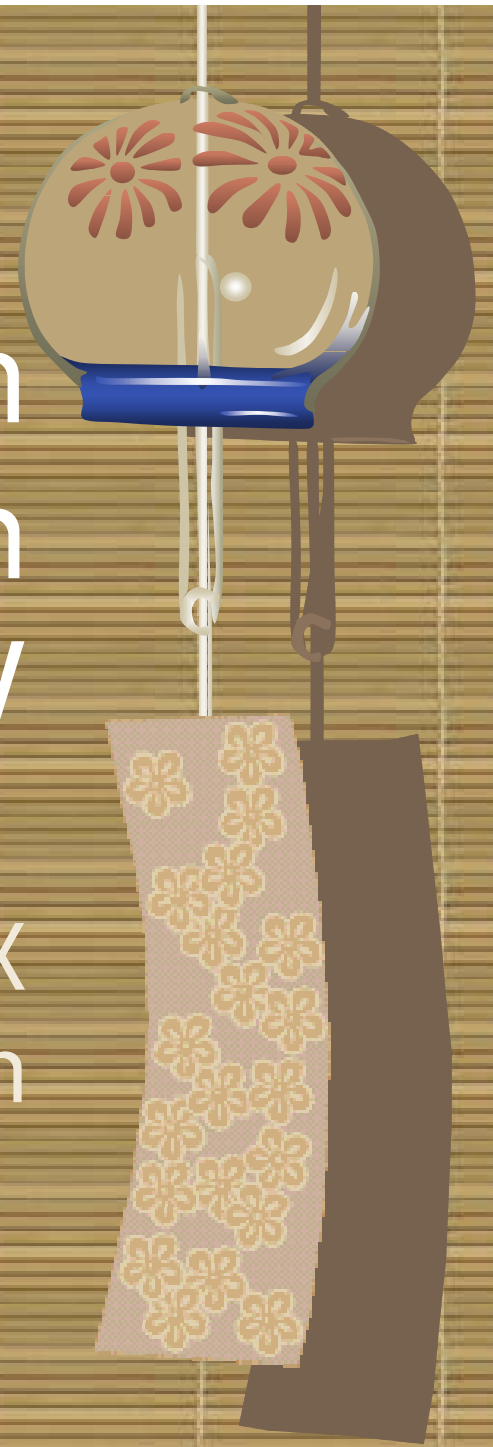


# $J/\psi$ measurement in d+Au collision with 200A GeV

S. Kametani for the PHENIX  
collaboration



# $J/\psi$ in QGP

## ◆ Quark Gluon Plasma

- New phase of matter caused in high density/temperature.

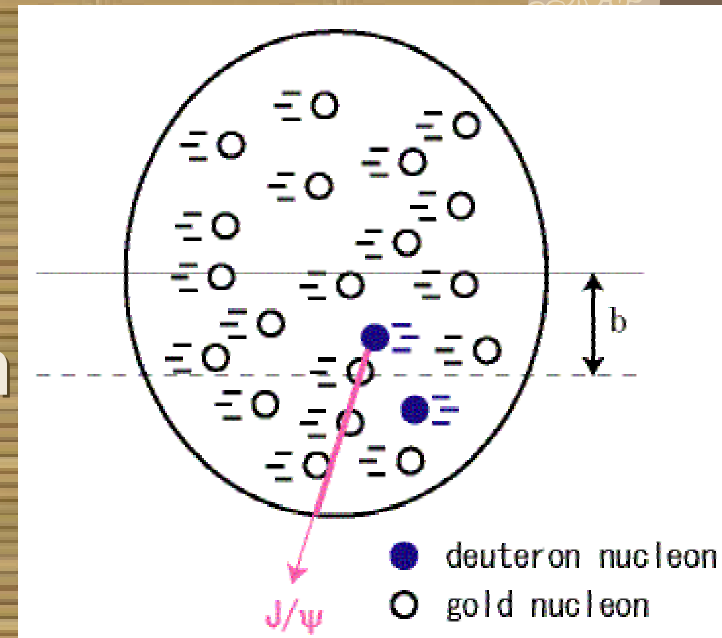
## ◆ Deconfinement of hadron leads to

- $J/\psi$  suppression in QGP
  - ◆ Initial  $J/\psi$  “melt” in QGP because of color Debye screening
- $J/\psi$  enhancement at hadronization
  - ◆ Mobility of heavy quarks in the deconfined region leads to recombination of charmonium



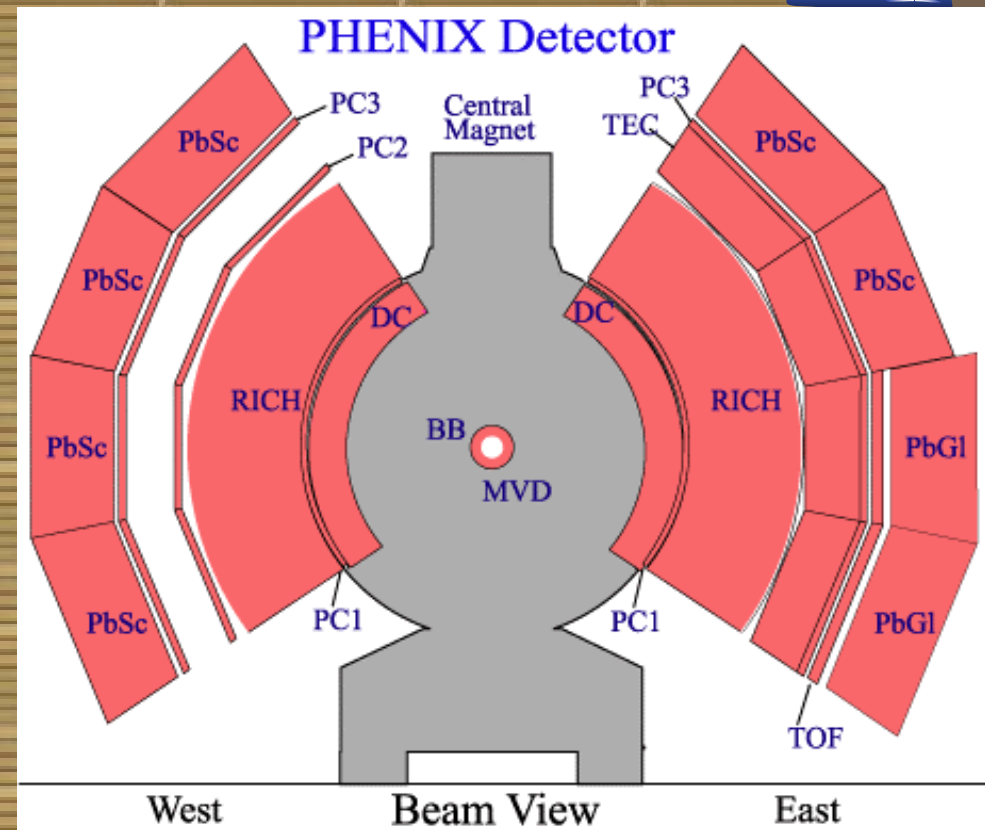
# $J/\psi$ in d+Au

- ◆ Base study on nuclear effect is required for heavy ion collision!
  - Absorption in nuclear matter
    - ◆ Absorption cross section is relevant with path length
  - Shadowing effect
- ◆ Study dependence on
  - Impact parameter  $\rightarrow$  absorption
  - $N_{\text{coll}} \rightarrow J/\psi$  production



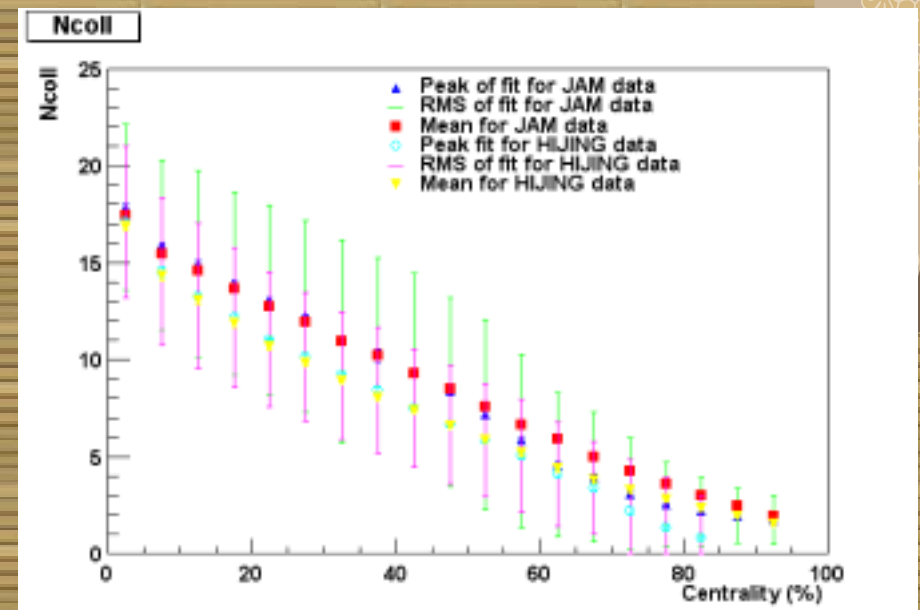
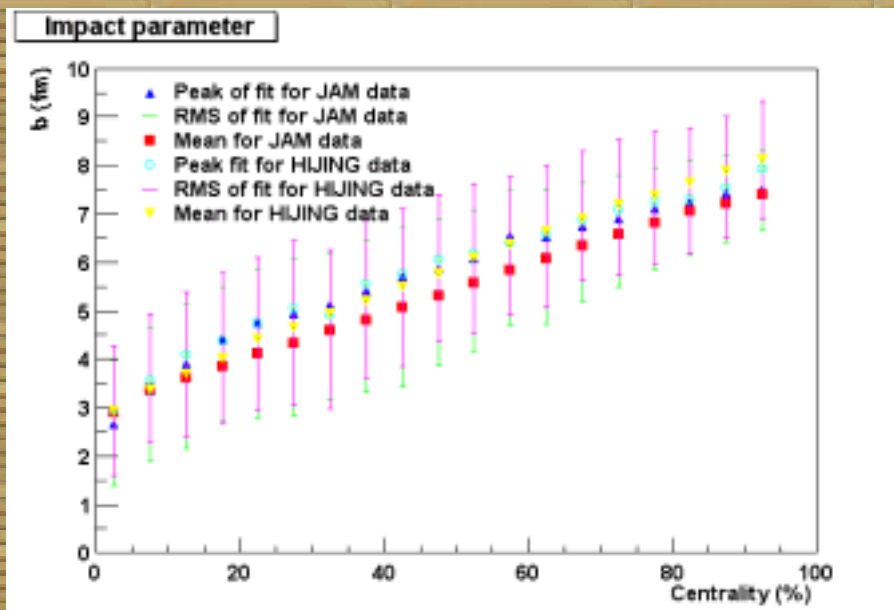
# PHENIX setup

- ◆ Vertex, Centrality
  - Beam Beam Counter
- ◆ Tracking
  - Drift Chamber
  - Pad Chamber
- ◆ Energy measurement
  - EM Calorimeter
- ◆ Electron ID
  - RICH
- ◆ eID  $p_T$  range :  $0.2 \sim 4.9 \text{ GeV}/c$
- ◆ Trigger
  - BBC for collision and event vertex
  - RICH + EMC mix (ERT) for electron



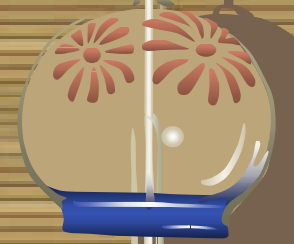
# Some works in progress (I)

- ◆ Impact parameter and  $N_{\text{coll}}$  determination using BBC
  - Determined centrality from simulated BBC hit data from JAM event
  - Calculated impact parameter and  $N_{\text{coll}}$  for each centrality bin from JAM profile
  - impact parameter and  $N_{\text{coll}}$  for HIJING data was also calculated

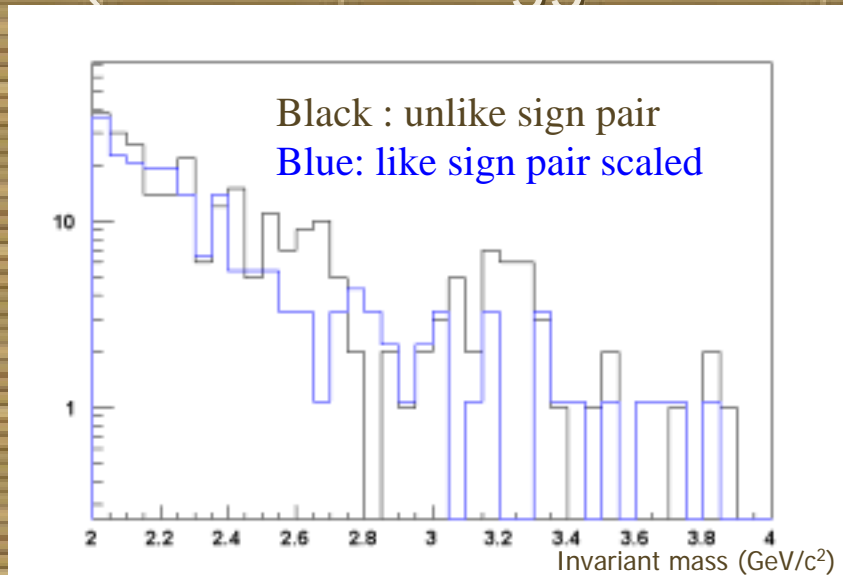


$\langle N_{\text{coll}} \rangle$  from JAM is 8.83

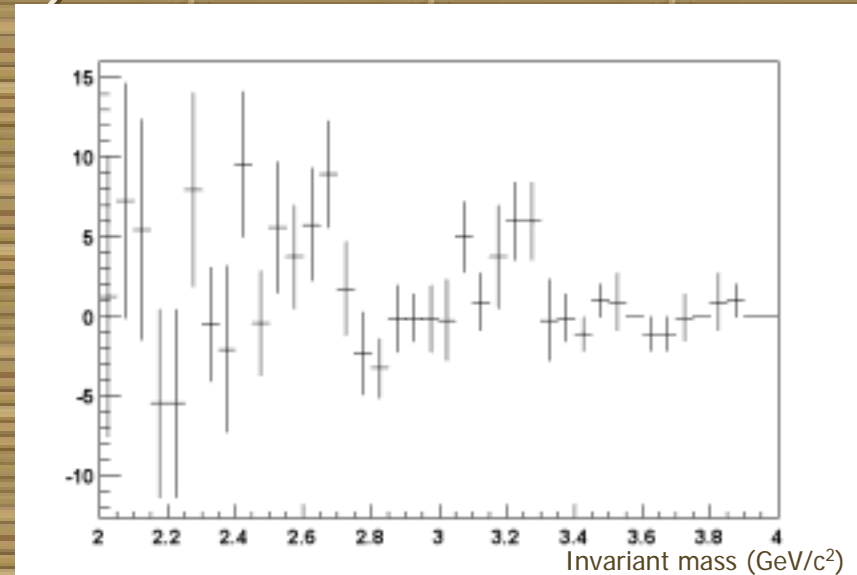
# Some works in progress (II)



- ◆ Invariant mass spectrum from calibration dataset (8.5 M ERT triggered event)



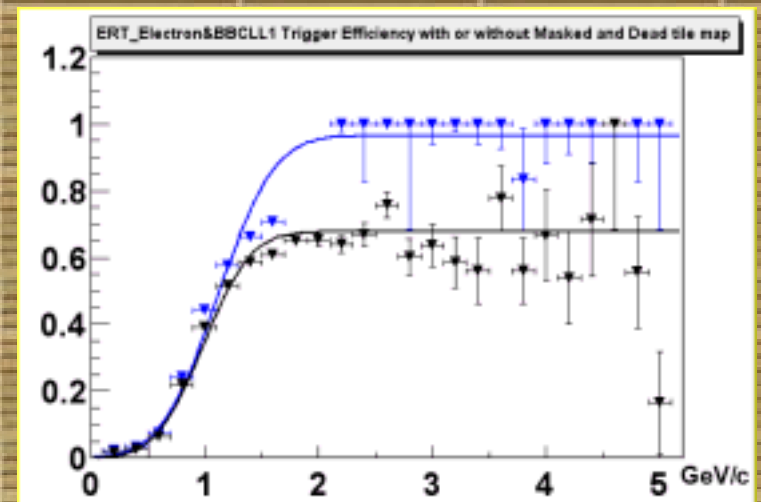
Invariant mass spectrum  
for electron candidate



Black subtracted by blue

*Count within 3- 3.5GeV/c<sup>2</sup> : 20.9*

- ◆ Triggering efficiency calculation
  - From F. Kajihara's talk (10pSF-15)





# Estimation of available $J/\psi$



## ◆ From pp cross section:

- $p+p \rightarrow J/\psi$  :  $3.99\mu\text{b}$  (from PHENIX Run-2  $p+p$ )
- Integrated BBCLL1 Ldt:  $2.6(\text{nb})^{-1}$
- Simulated  $\langle N_{\text{coll}} \rangle$  in d+Au : 8.83
- $J/\psi \rightarrow e^+e^-$  : 5.93%
- Acceptance \* Triggering efficiency:  $0.026 * \sim 0.9$

$\rightarrow \sim 130 J/\psi$

## ◆ From calibration dataset:

- Total ERT scaled triggered event :  $\sim 72,000,000$
- Count within invariant mass range of 3-  
3.5  $\text{GeV}/c^2$  : 20.9 for 8.5 M event

$\rightarrow \sim 180 J/\psi$

# Summary

- ◆  $J/\psi$  measurement is important for QGP study
- ◆ Nuclear effect study on  $J/\psi$  is being performed from RHIC Run-3 d+Au collision data

