Summary of Quark Matter 2009

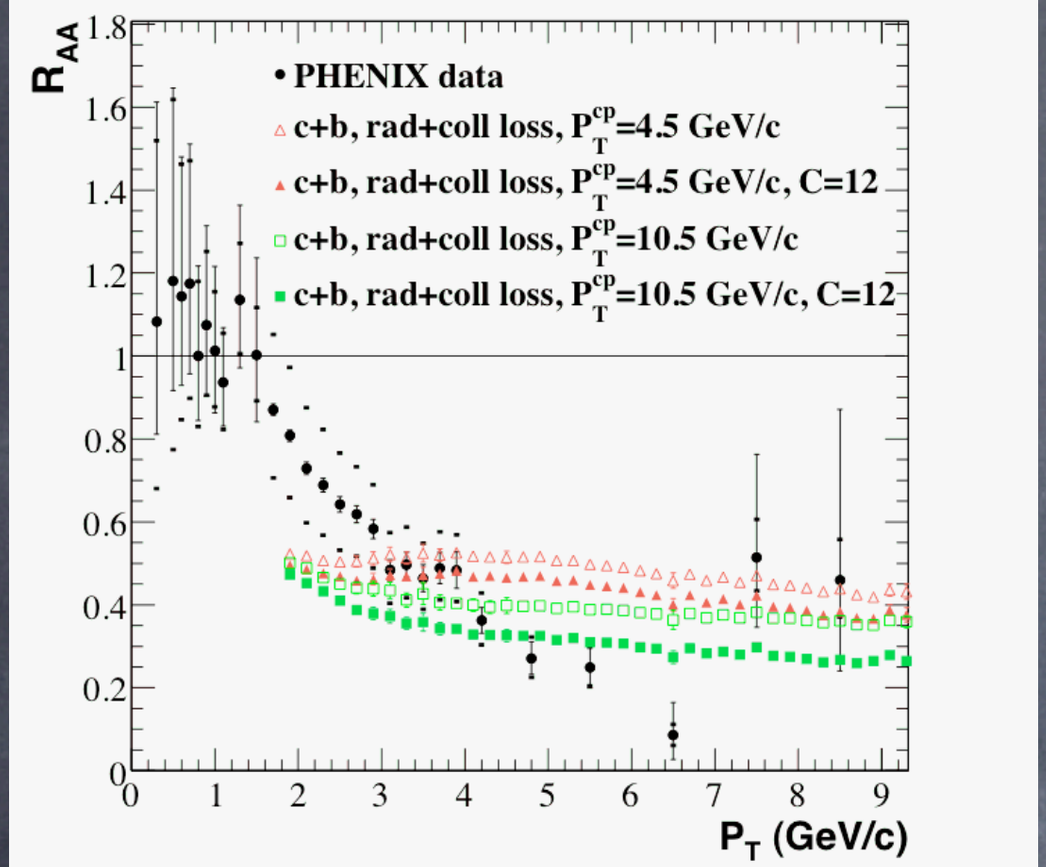
- Charm and Bottom Cross Section & Energy Loss via non-photonic electron

MinJung Kweon

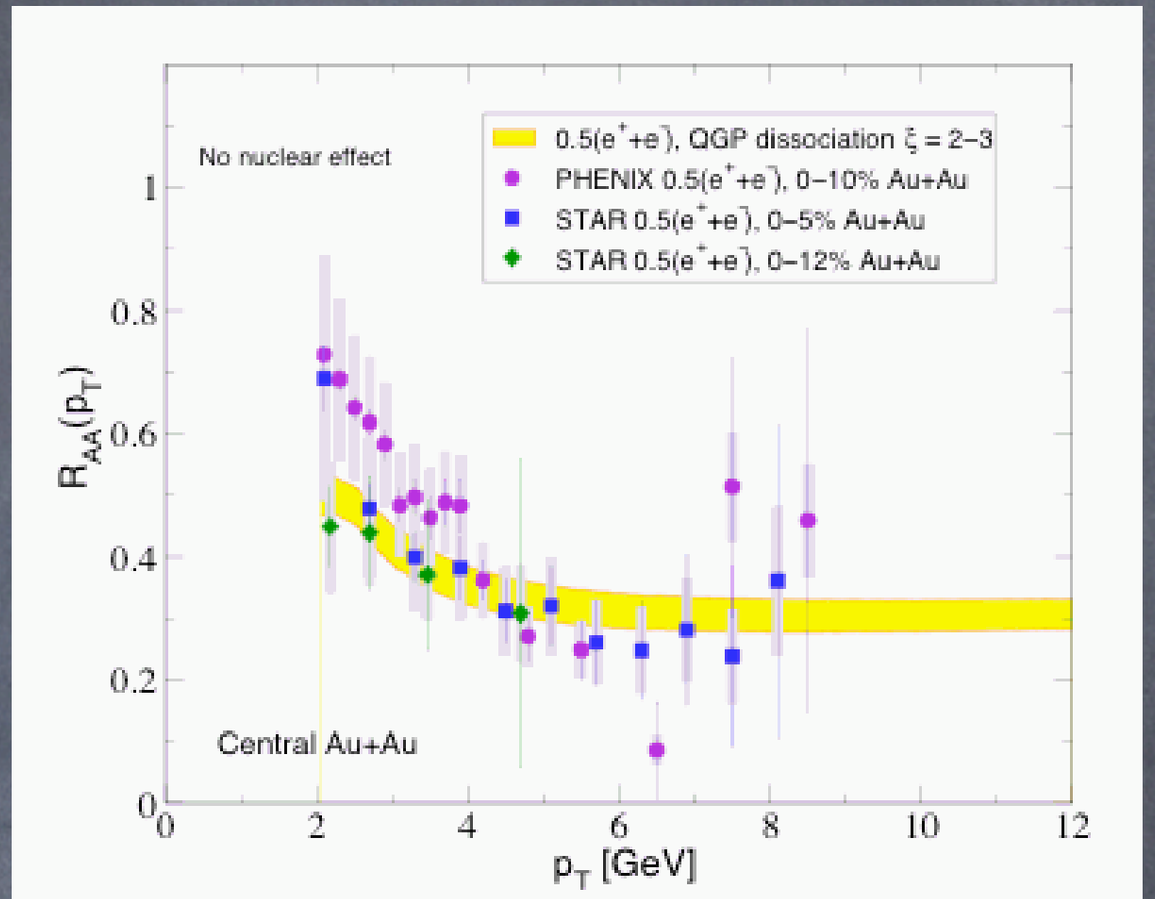
May 13 2009, HD Lunch Seminar

Heavy Quark Energy Loss at RHIC

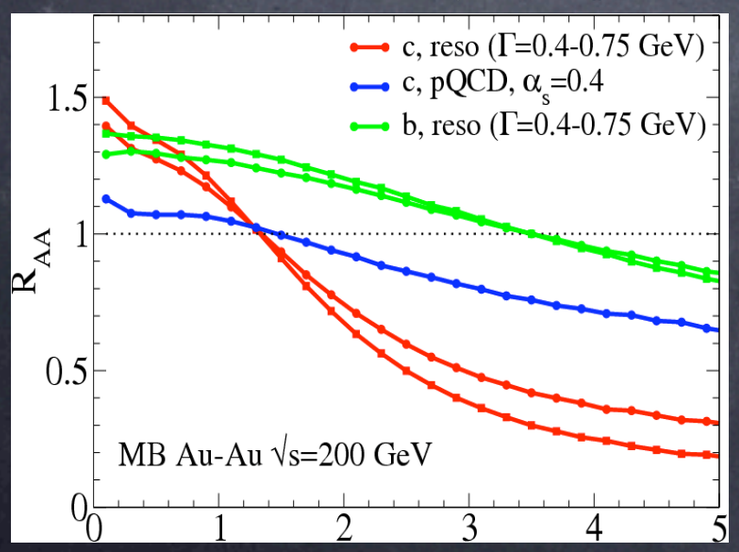
Garcia-Martinez, et.al.arXiv:hep-ph/0702035v2 2007



Vitev, I .et. Al J. Phys. G Nucl. Part. Phys. 34

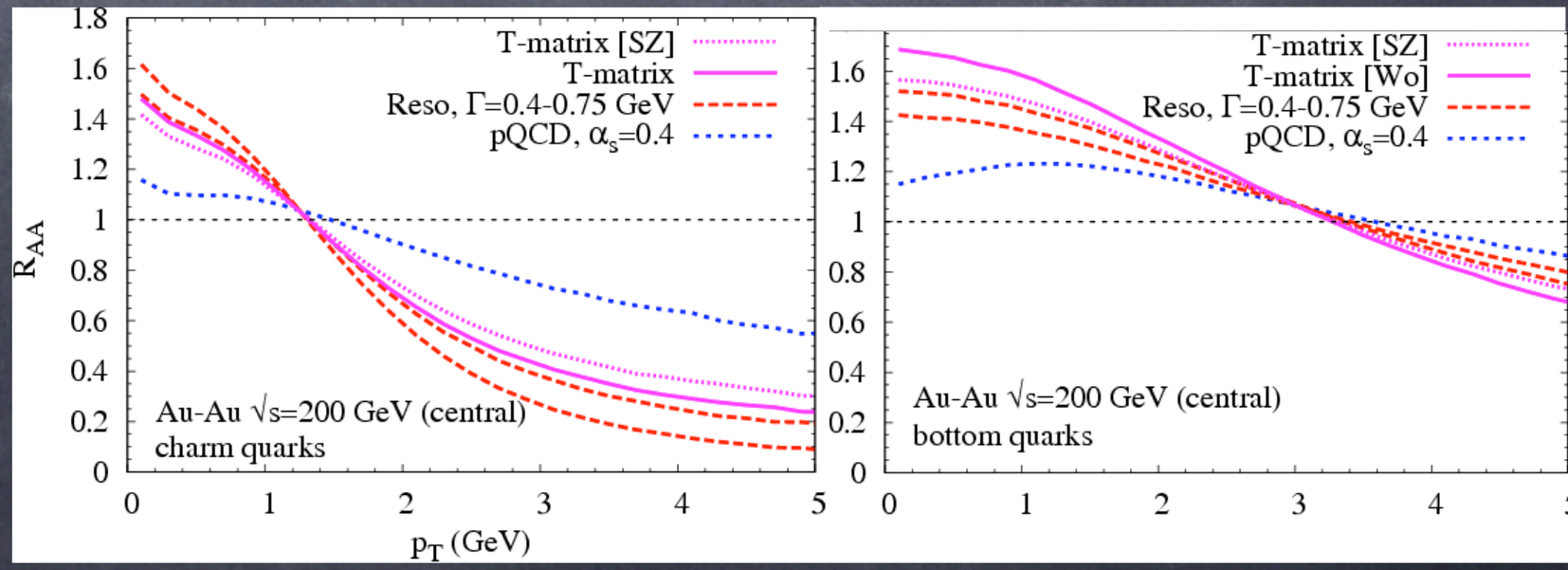


Resonance Mode + Expanding Fireball



Van Hees,Greco + PR '05

Relativistic Langevin simulation in thermal fireball background



Wiedemann et al. '05, Wicks et al. '06, Vitev et al.'06, Ko et al. '06

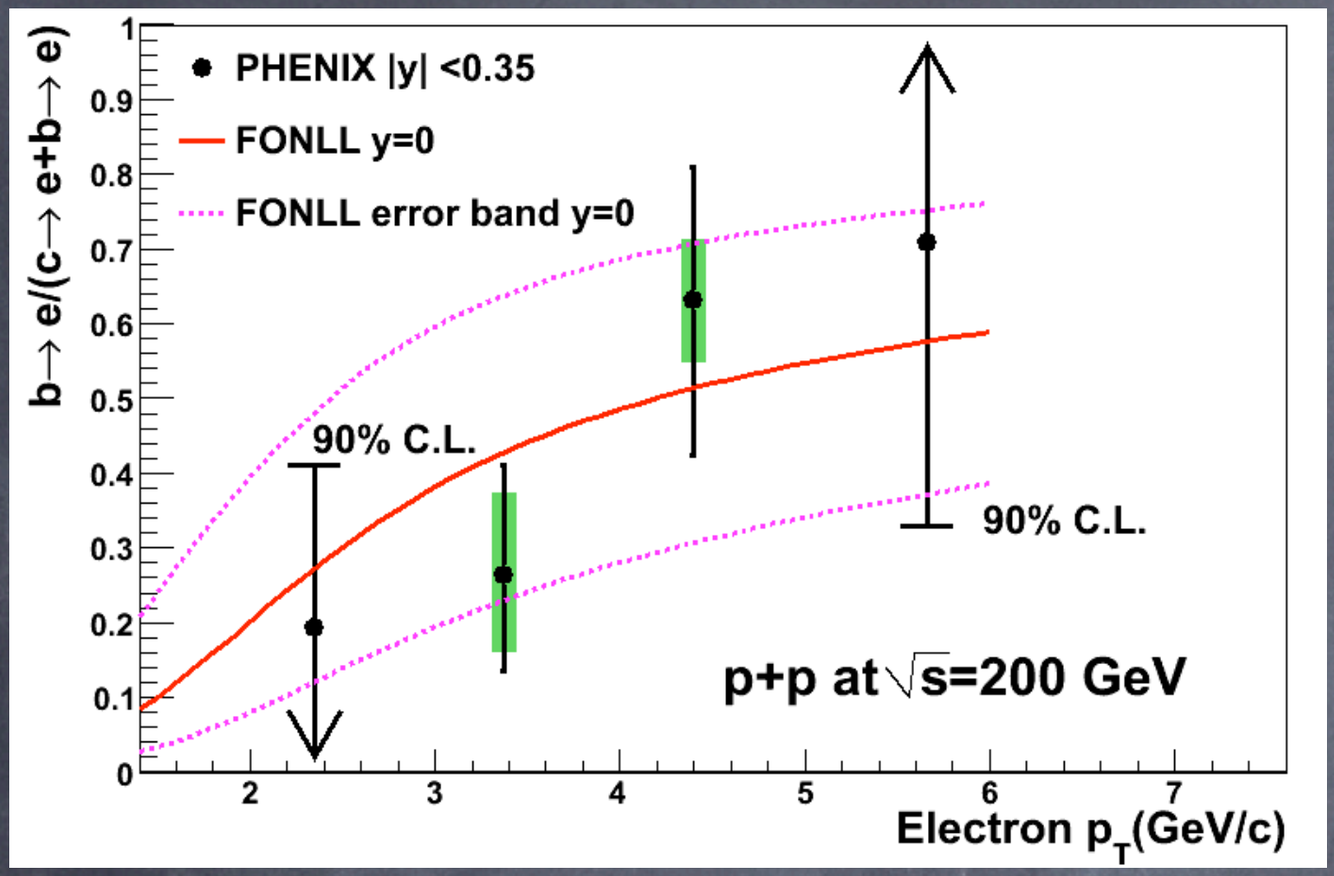
Charm/Bottom Separation Using e-h Correlations

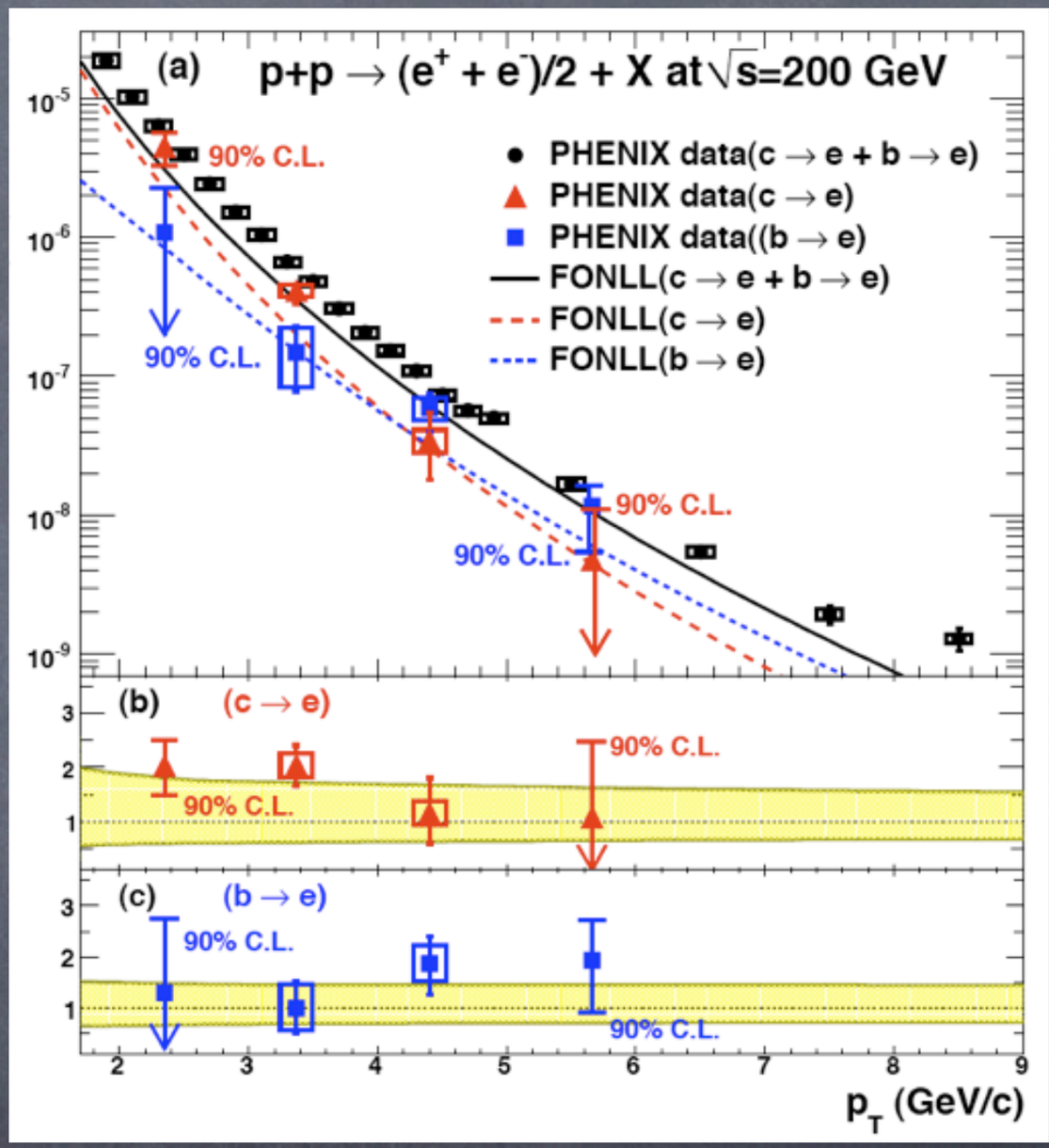
Tatia Engelmore

For the PHENIX Collaboration

Quark Matter 2009
(arXiv:0903.4851 hep-ex)

Charm to Bottom Ratio

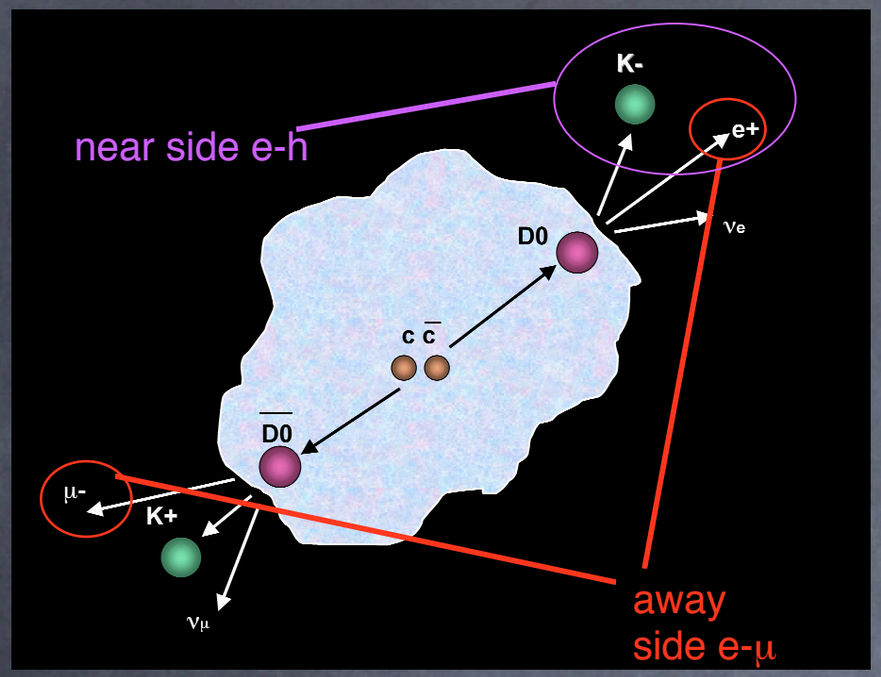




- Charm-to-bottom ratio in p+p (left).
- Comparison of charm and bottom cross sections in p+p (right).

- Spectrum is extrapolated to $p_T = 0$ using the shape predicted by pQCD calculation
- $d\sigma_{bb}/dy|_{y=0} = 0.92$ μb, using HVQMNR PDF: $\sigma_{bb} = 3.2$ μb
- PHENIX result from the dielectron spectrum: $\sigma_{bb} = 3.9$ μb
- FONNL: $\sigma_{bb} = 1.87$ μb (here, didn't write down the error bar. agree within error bar)

Method to get (b → e)/(c → e + b → e) [1]



- Partial reconstruction of D/D̄ → $e^{\pm}K^{\mp}X$
  - Construct unlike charge-sign near-side electron-hadron pairs
  - Calculate e-K invariant mass, below the D meson mass of ~ 1.9 GeV/c, it reveals a correlated signal of D

- Inclusive reconstructed e-h pairs are:
  - Unlike-sign pairs from charm
  - Unlike-sign pairs from beauty
  - Combinatoric background where the electron is a background electrons → main BG sources mostly from conversion electrons
  - Background from unlike-sign h-h pairs due to hadron contamination

Method to get (b → e)/(c → e + b → e) [2]

- Subtract like-sign pairs to remove background
- Calculate # of BG subtracted unlike-sign e-h pairs for invariant mass within $0.4 < M_{eK} < 1.9$ GeV/c

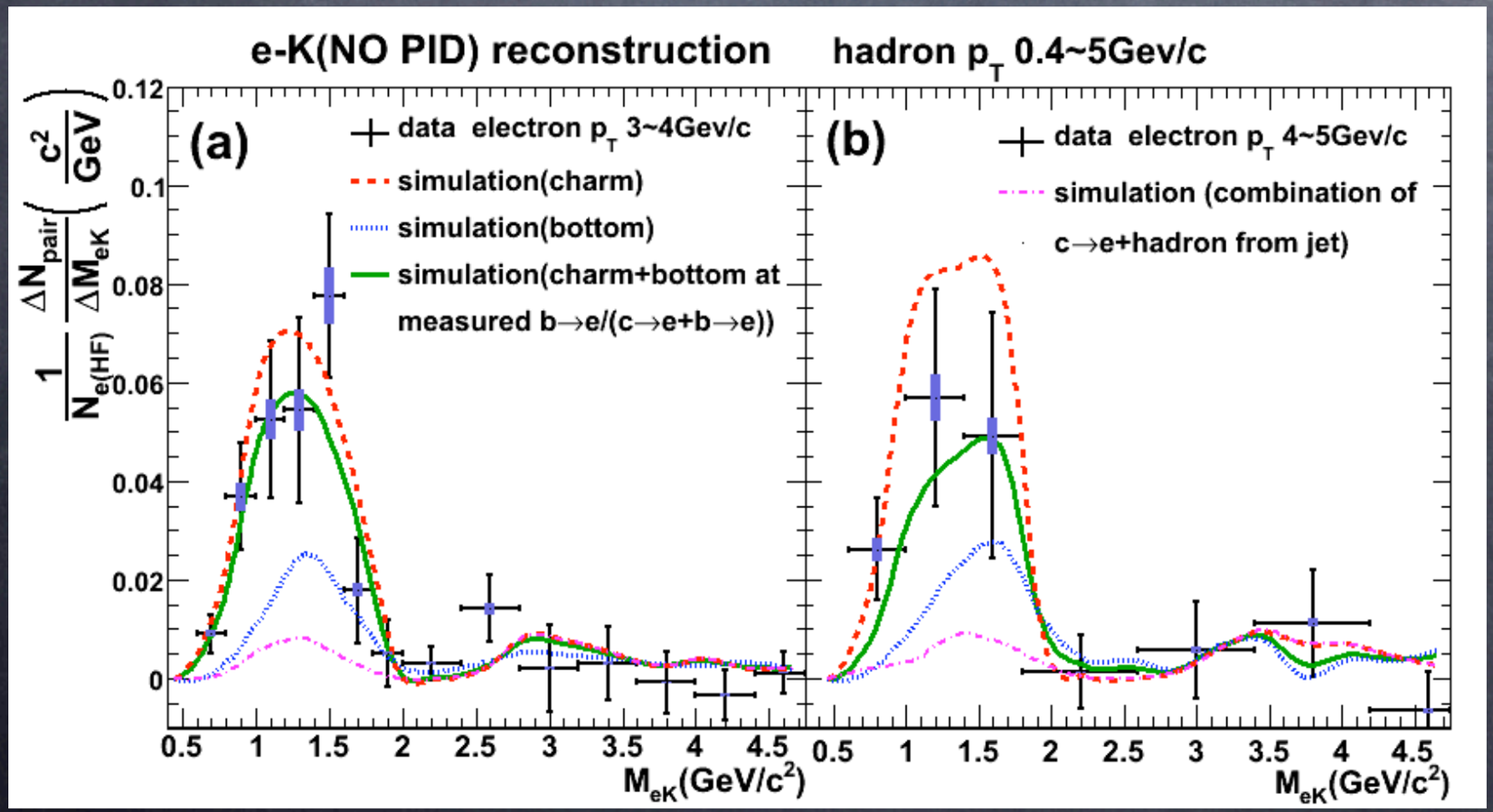
$$\frac{N_{b\to e}}{N_{c\to e}+N_{b\to e}} = \frac{\epsilon_c - \epsilon_{data}}{\epsilon_c - \epsilon_b}$$

$$\epsilon_{data} \equiv \frac{N_{tag}}{N_{e(non-photonic)}} = \frac{N_{c\to tag}+N_{b\to tag}}{N_{c\to e}+N_{b\to e}}$$

# of measured heavy flavor electrons

$$\epsilon_c \equiv \frac{N_{c\to tag}}{N_{c\to e}}, \epsilon_b \equiv \frac{N_{b\to tag}}{N_{b\to e}}$$

- Use Pythia to find charm and bottom tagging efficiencies.



- Combine efficiencies to get charm to bottom ratio.
- (b → e)/(c → e + b → e)
  - 0.26 at $3 < p_T < 4$ GeV/c
  - 0.63 at $4 < p_T < 5$ GeV/c

Non-Photonic Electron-Hadron Azimuthal Correlation for Au+Au, Cu+Cu and p+p collisions at $\sqrt{s}$= 200 GeV

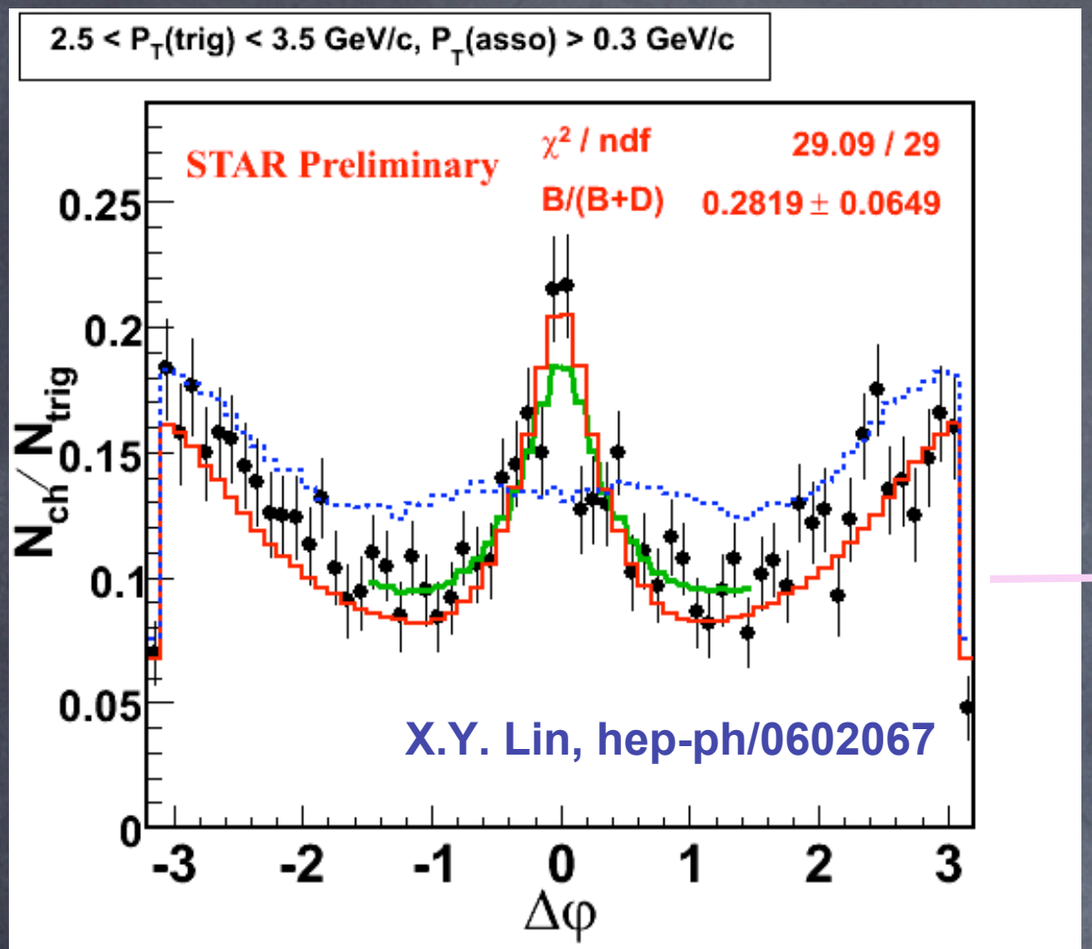
Bertrand Biritz

For the STAR Collaboration

Quark Matter 2009

(arXiv:hep-ph/0602067)

Non-photonic e-h correlations in p+p 200 GeV



- Clear azim. correlation is observed around near and away side
- Fitting measured dn/dϕ distribution for B and D decays, we can estimate B decay contribution to non-photonic electron.

$$\Delta\phi_{e-h} = r_B \Delta\phi^B_{e-h} + (1 - r_B)\Delta\phi^D_{e-h}$$

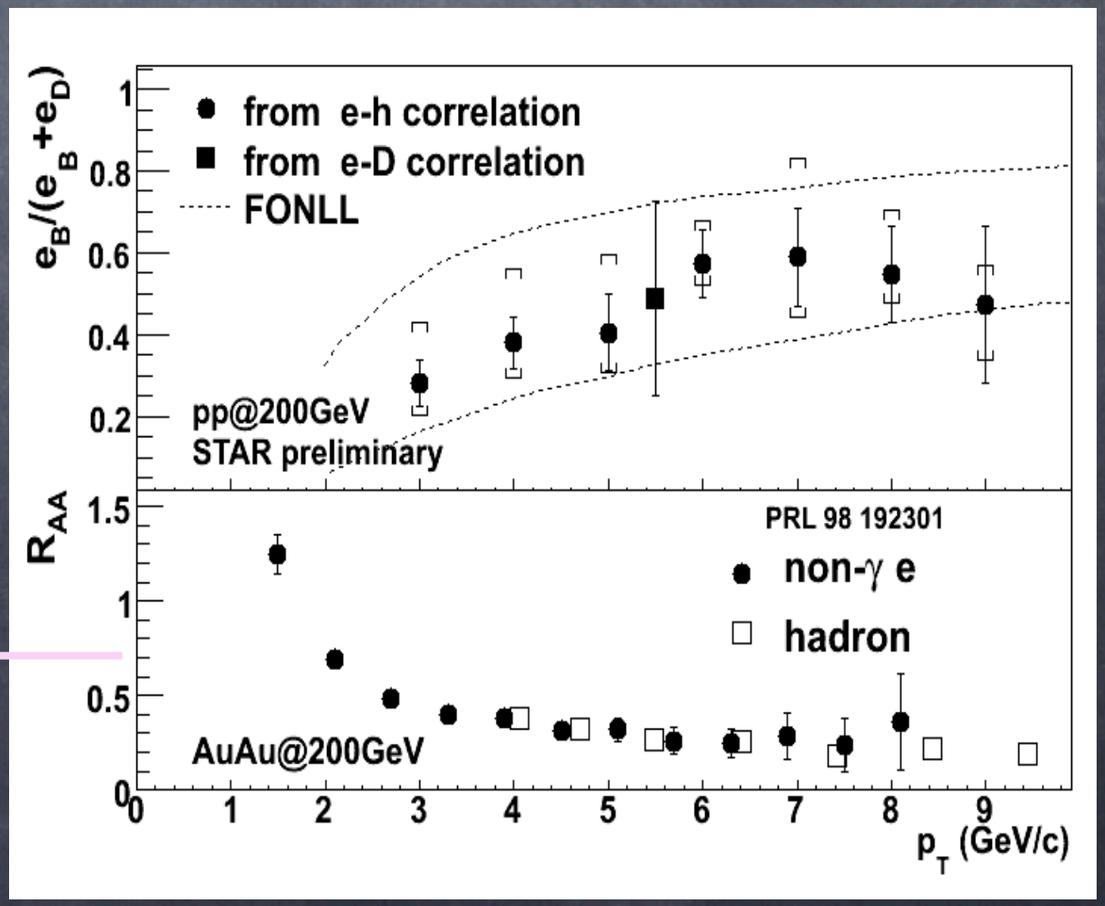
$$r_B = e_B / (e_D + e_B)$$

$$R_{AA} = \frac{e_B^{AA} + e_C^{AA}}{N_{bin}(e_B^{pp} + e_C^{pp})}$$

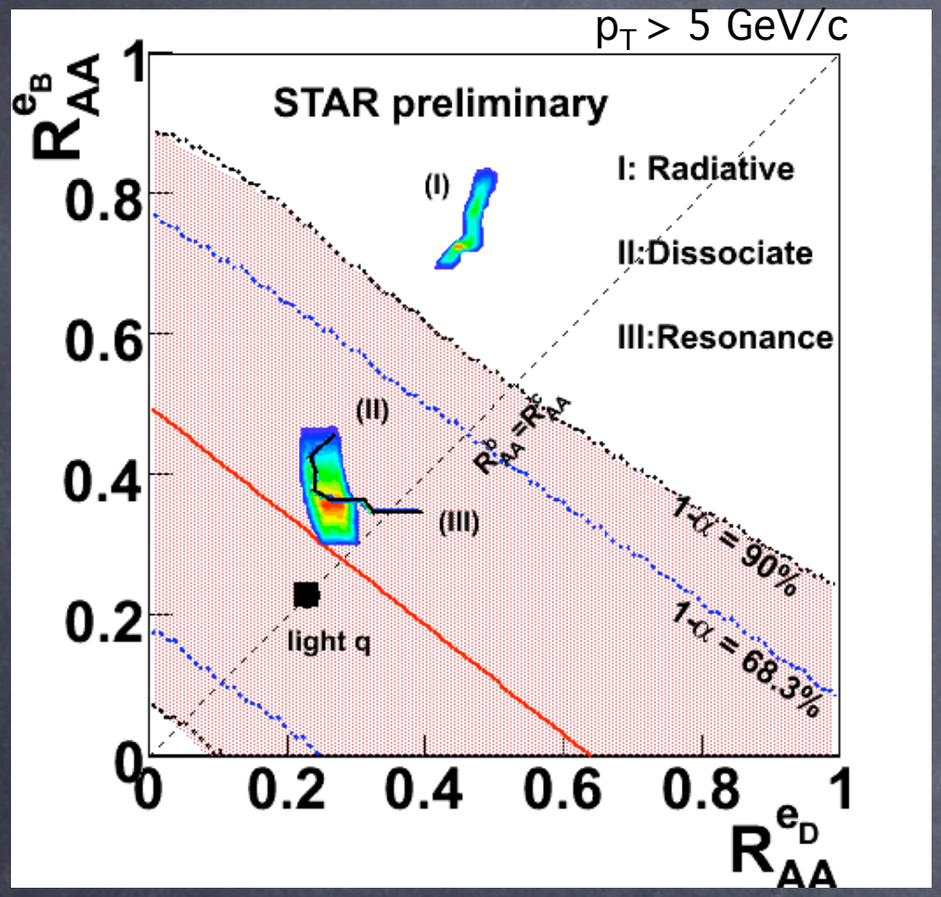
$$= \frac{e_B^{AA}}{N_{bin} e_B^{pp}} \cdot \frac{e_B^{pp}}{(e_B^{pp} + e_C^{pp})} + \frac{e_C^{AA}}{N_{bin} e_C^{pp}} \cdot \frac{e_C^{pp}}{(e_B^{pp} + e_C^{pp})}$$

$$= r_B R_{AA}^{e_b} + (1 - r_B) R_{AA}^{e_c}$$

$$r_B = e_B^{pp} / (e_B^{pp} + e_C^{pp})$$



$R^{e(c)}_{AA}$ and $R^{e(b)}_{AA}$ Correlation



- $R^{e(c)}_{AA}$ and $R^{e(b)}_{AA}$ correlation together with models
- $R^{e(b)}_{AA} < 1$; B meson is also suppressed
- prefer Dissociate (II) and Resonance (III) model(large b energy loss)

I: ***Djordjevic, Gyulassy, Vogt and Wicks,*** *Phys. Lett. B 632 (2006) 81; $dN_g/dy = 1000$*
II: ***Adil and Vitev,*** *Phys. Lett. B 649 (2007) 139*
III: ***Hees, Mannarelli, Greco and Rapp****, Phys. Rev. Lett. 100 (2008) 192301*

- Comparable B and D contributions for electron pT from 5.5 ~ 9 GeV/c
- FONNL prediction and the $e_B/(e_B+e_D)$ results are consistent with each other within errors