

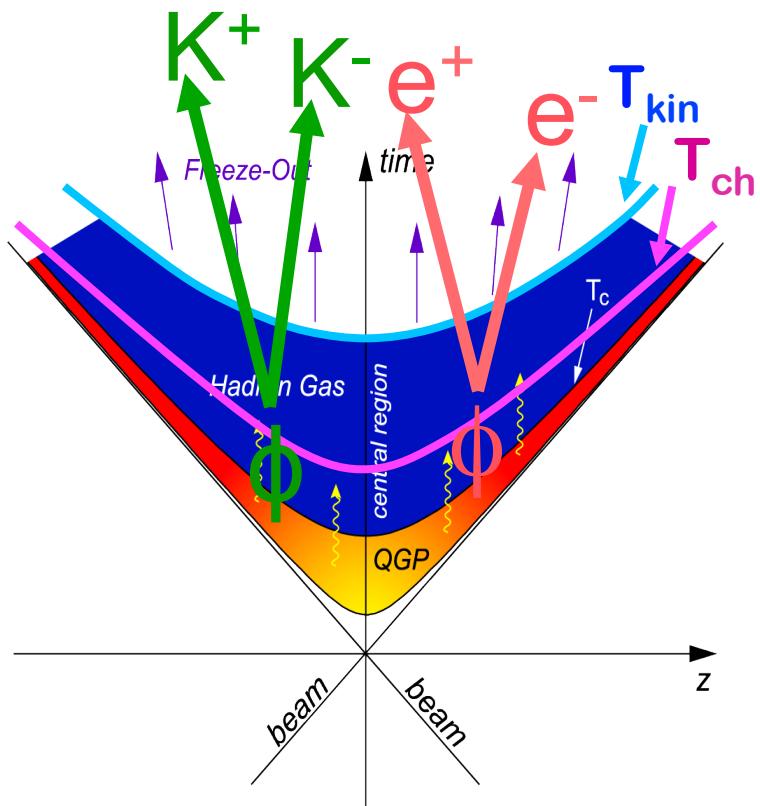
# $\phi$ and $\omega$ Mesons from Dielectron Decays at STAR



Masayuki Wada  
University of Texas at Austin  
For the STAR Collaboration



# Resonances In Medium



- Resonance particles are short lived particles (strong interaction).
  - decay inside medium
  - sensitive to medium effects (mass shift, width broadening possible link to chiral symmetry restoration)

## Hadronic Decay

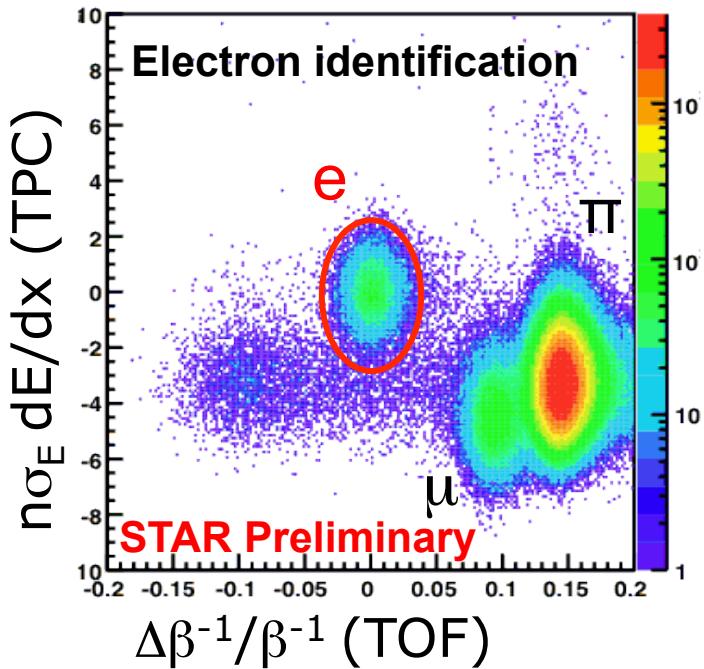
- Interact with hadronic medium
- sensitive to lifetime of hadronic medium

## Leptonic Decay

- Less interaction with hadronic medium
- Small branching ratio  $\sim 10^{-4}$

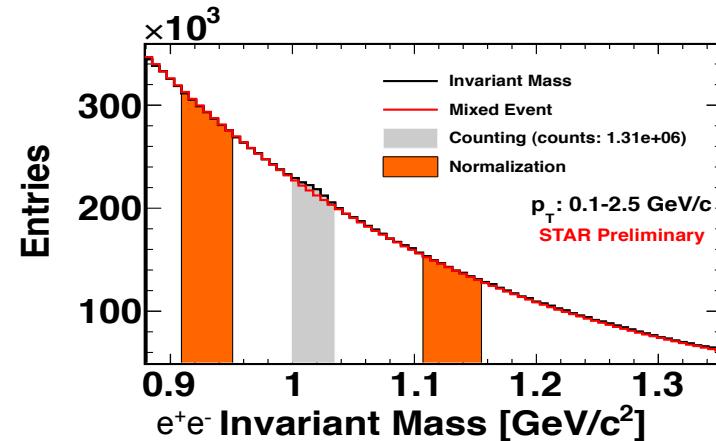
Resonance	Lifetime [fm/c]	decays (BR)
$\phi$ (1020)	46.3	$K^+ + K^-$ , $e^+ + e^- (10^{-4})$
$\omega$ (782)	23.2	$\pi^+ \pi^- \pi^0$ , $e^+ + e^- (10^{-5})$

# $\phi(1020) \rightarrow e^+e^-$ Signal

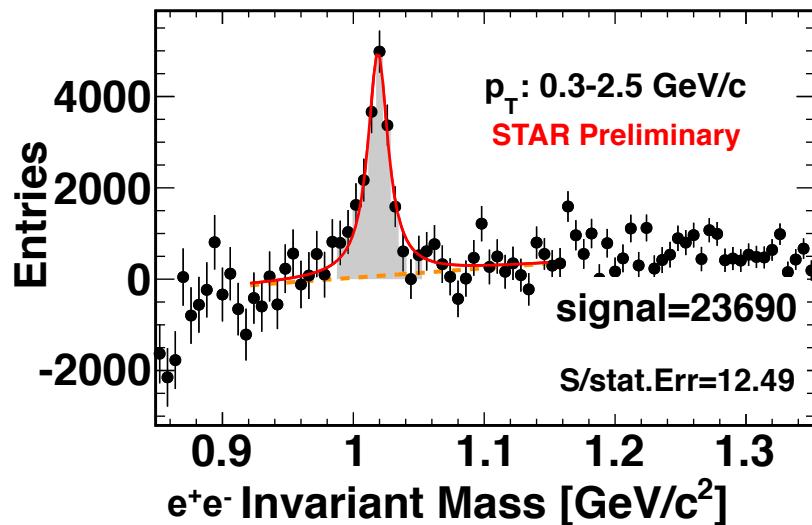


Au+Au (0-80%)  $\sqrt{s_{NN}} = 200\text{GeV}$

Normalized Mixed Event Background

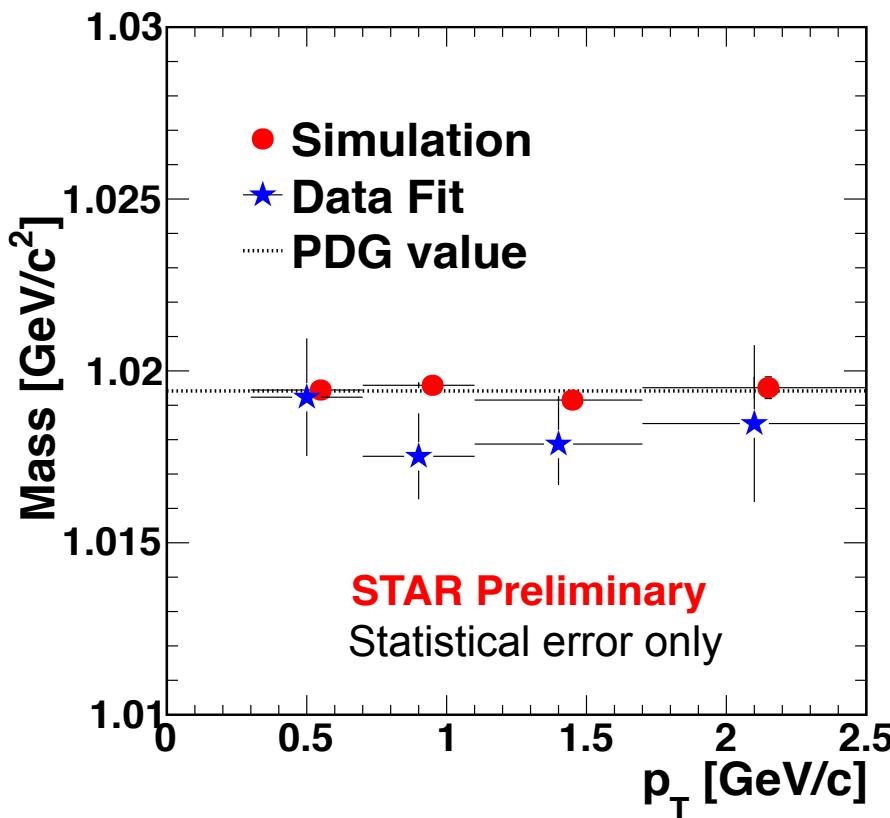


After Background Subtraction

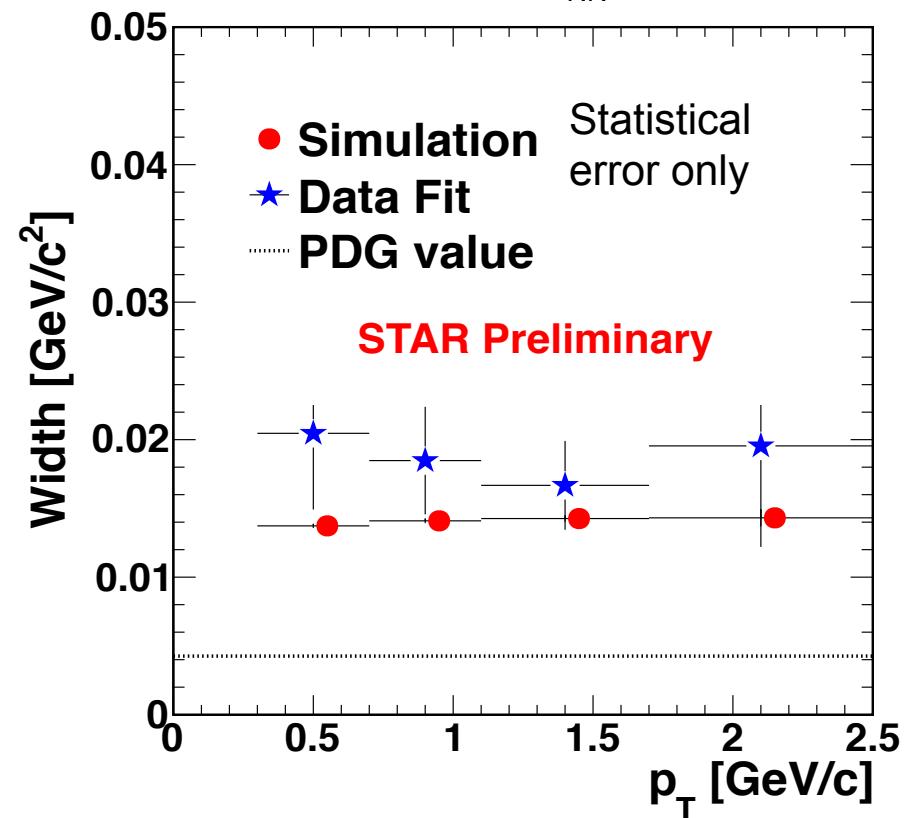


# $\phi$ Mass & Width vs. $p_T$

Fit with Breit-Wigner function

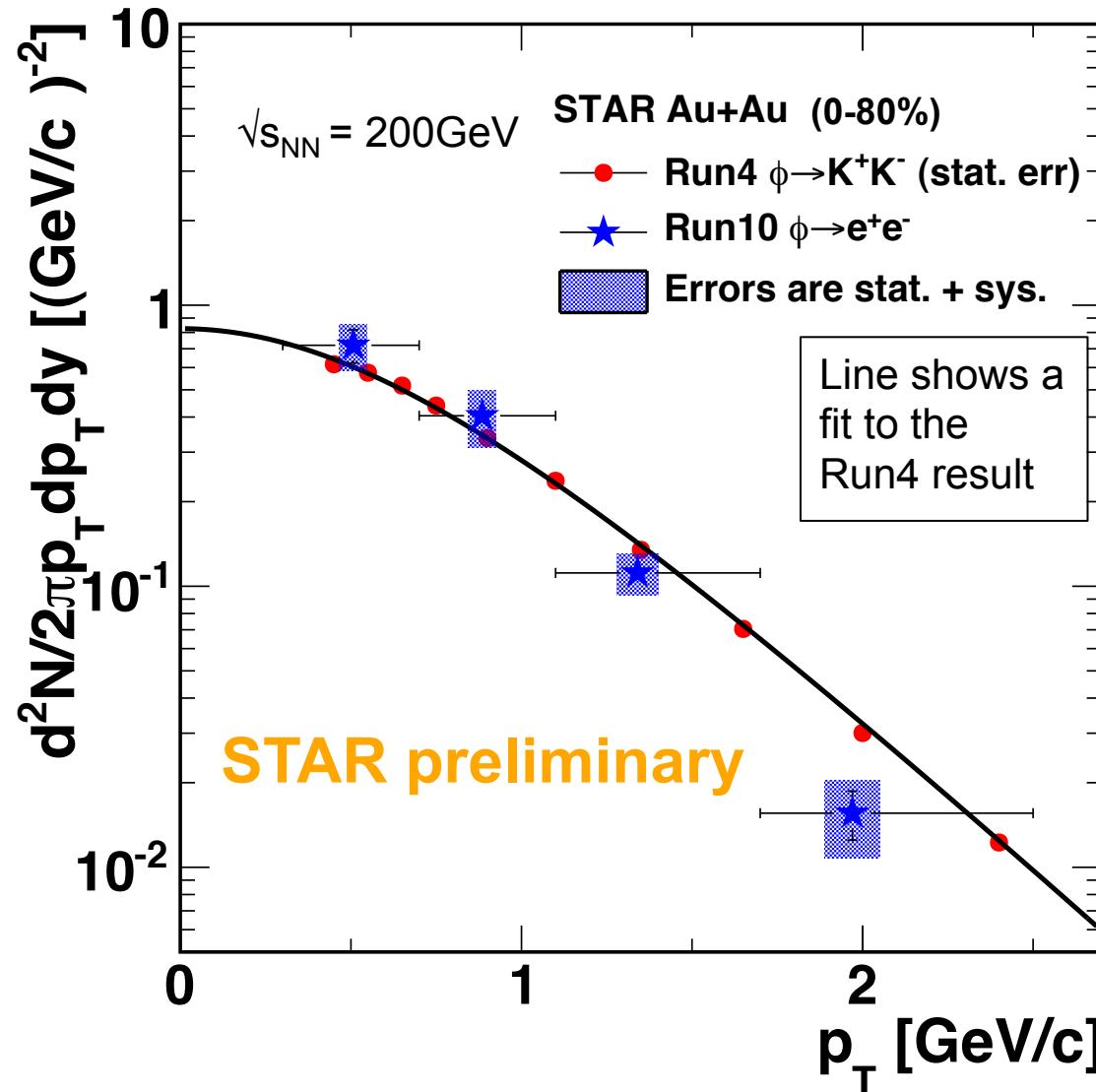


Au+Au (0-80%)  $\sqrt{s_{NN}} = 200\text{GeV}$



Mass and width are in agreement with the simulation.  
→No mass shift or width broadening

# Comparison to Hadronic Decay



No significant difference between hadronic and leptonic decay channel within the errors.

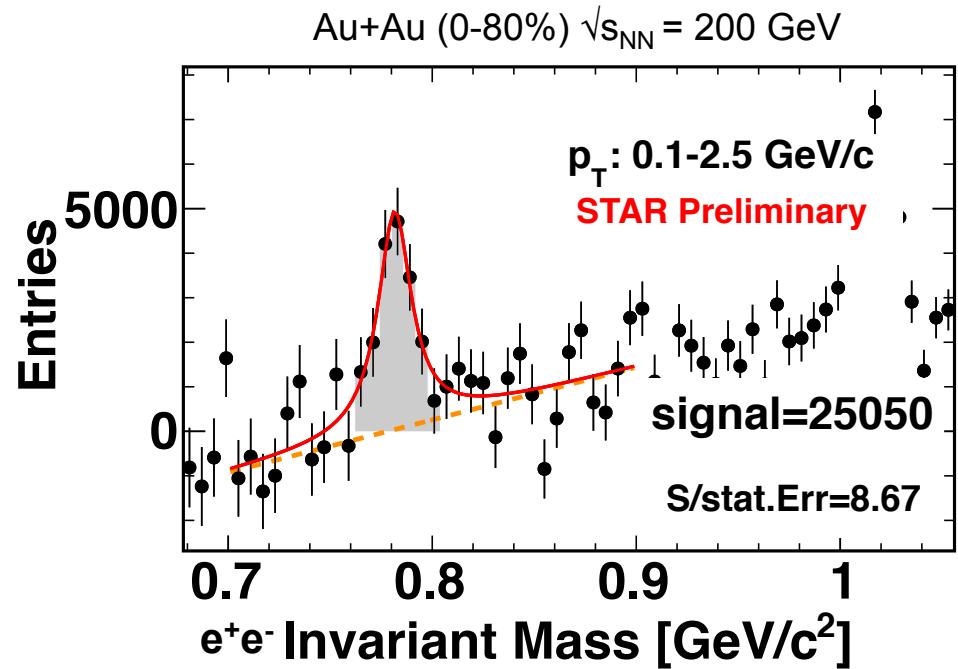
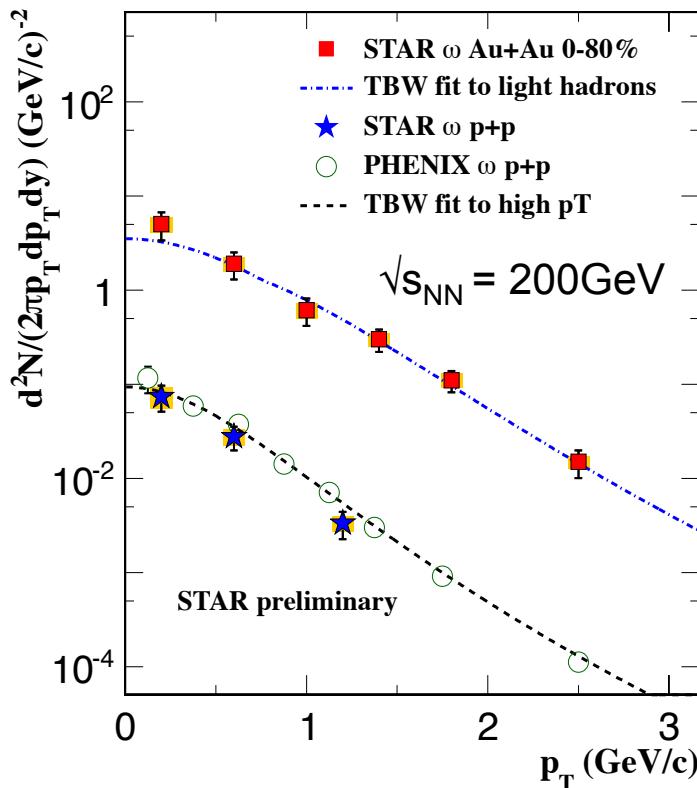
This study  $\phi \rightarrow e^+e^-$  (0-80%)  
 $\langle p_T \rangle = 0.87 \pm 0.05 \pm 0.07$  [GeV/c]  
 $dN/dy = 2.87 \pm 0.17 \pm 0.23$

Run4  $\phi \rightarrow K^+K^-$  (0-80%)  
 $\langle p_T \rangle = 0.96 \pm 0.01$  [GeV/c]  
 $dN/dy = 2.68 \pm 0.15$   
(Stat. err only)

B. I. Abelev et al., Phys. Rev. C79, 064903 (2009)

# $\omega(782) \rightarrow e^+e^-$

Production in p+p and Au+Au



Measurement of  $\omega$  mass and width are under study.

- p+p and Au+Au results are consistent with the predictions based on a Tsallis-Blast-Wave fit.
- p+p results are consistent with PHENIX results.

STAR result: Phys. Rev. C **86** 024906 (2012)  
PHENIX result: Phys. Rev. D **83**, 052004 (2012)

# Summary

---

- The  $\phi \rightarrow e^+e^-$  result is **consistent** with  $\phi \rightarrow K^+K^-$  result.
- **No mass shift or width broadening** beyond the known detector effects are observed for  $\phi$  mesons.
- The  $\omega$  meson production in dielectron channel in p+p and Au+Au is measured and agrees with previous measurements.
- At BES physics program high statistics data is needed.

