

# Heavy-flavor electron production in Au+Au collisions at $\sqrt{s_{NN}} = 54.4$ GeV at STAR

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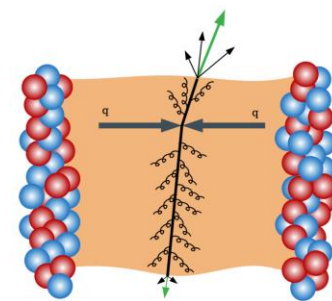
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# Motivation

Heavy quarks

- Dominantly produced in initial hard scatterings
- Heavy quarks:  $m_q \gg \Lambda_{QCD}$ ,  $m_q \gg T_{QGP}$
- Production cross-sections can be calculated in perturbative QCD
- Participate in the whole medium evolution



→ Ideal probes of QGP

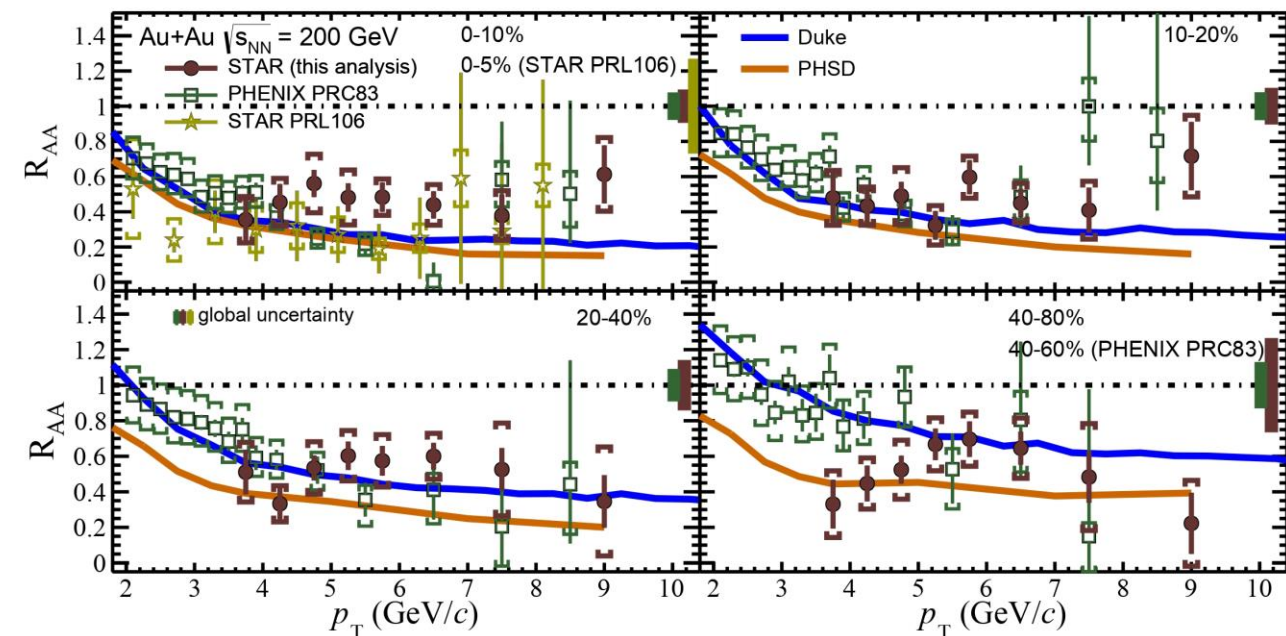
**Heavy-flavor electrons (HFE)** - Electrons from semi-leptonic decays of open heavy-flavor hadrons

**HFE suppression** in the QGP in Au+Au  
@ 200 GeV within  $3.5 < p_T < 8 \text{ GeV}/c$

**Significant energy loss of heavy quark (HQ) in QGP**

lower collision energies?

**Explore HQ energy loss at lower collision energy (54.4 GeV)**



STAR: JHEP06(2023)176  
PHENIX: V, Phys. Rev. C 84 (2011) 044905  
STAR: Phys. Rev. Lett. 98 (2007) 192301.

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# General idea of the analysis

$$N_{HFE} = \frac{N_{INCL} \cdot \text{purity} - N_{PE}/\epsilon_{PE}}{\epsilon_{tot}} - N_{HDE}$$

$\underbrace{\hspace{10em}}_{N_{NPE}}$

- $N_{INCL}$  - inclusive electron yield
- **purity** - purity of inclusive electrons
- $N_{PE}$  - photonic electron yield
- $\epsilon_{PE}$  - photonic electron identification efficiency
- $\epsilon_{tot}$  - total efficiency of electron identification and reconstruction

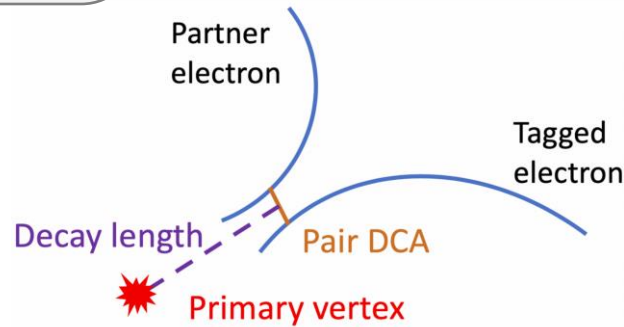
→ Ongoing + correction for HDE is planned

Photonic electron (PE) sources:

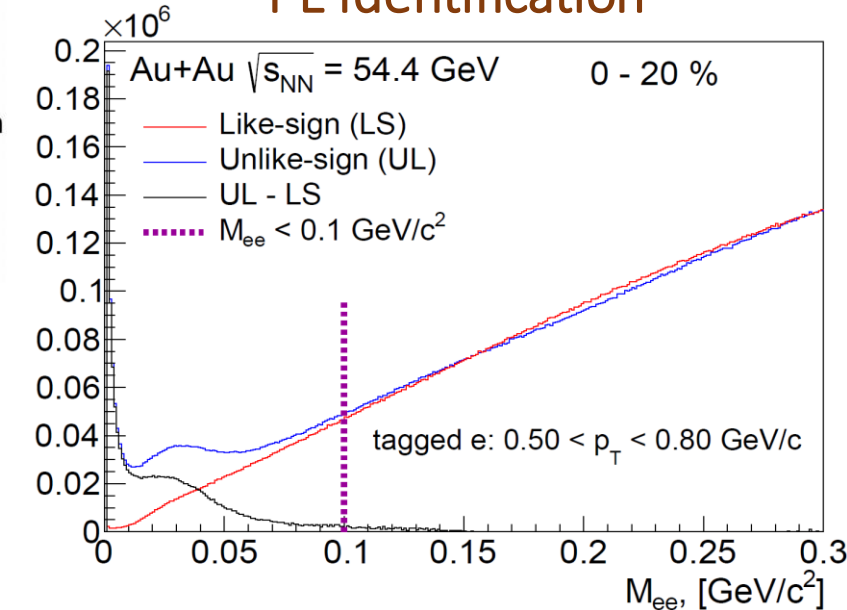
1. Dalitz decays ( $\pi^0/\eta \rightarrow \gamma e^+ e^-$ )
2. Gamma conversion ( $\gamma \rightarrow e^+ e^-$ ,  $\pi^0/\eta \rightarrow \gamma\gamma$ )

Hadron-decayed electrons (HDE):

- $\rho, \omega, \phi$
- $J/\psi, \Upsilon$
- Drell-Yan
- $K_{e3}$



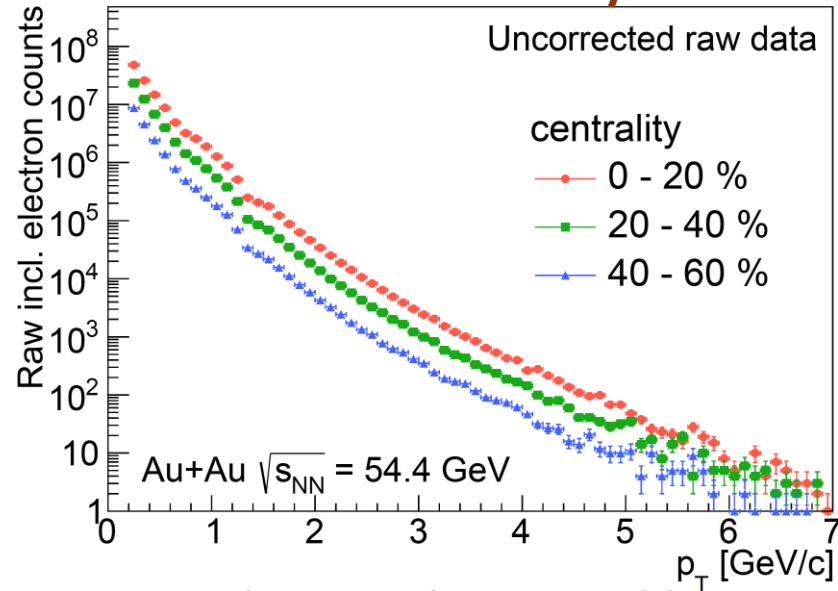
## PE identification



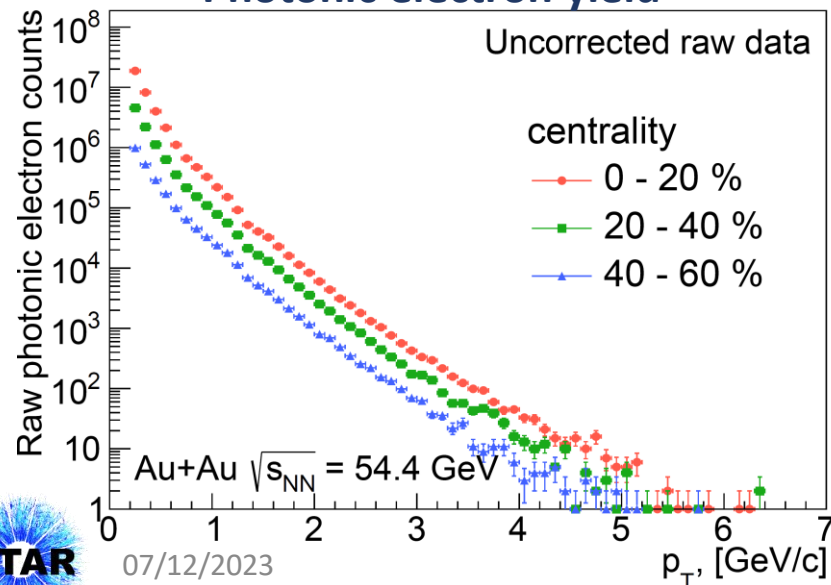
# Results

Analysis ongoing in STAR

## Inclusive electron yield

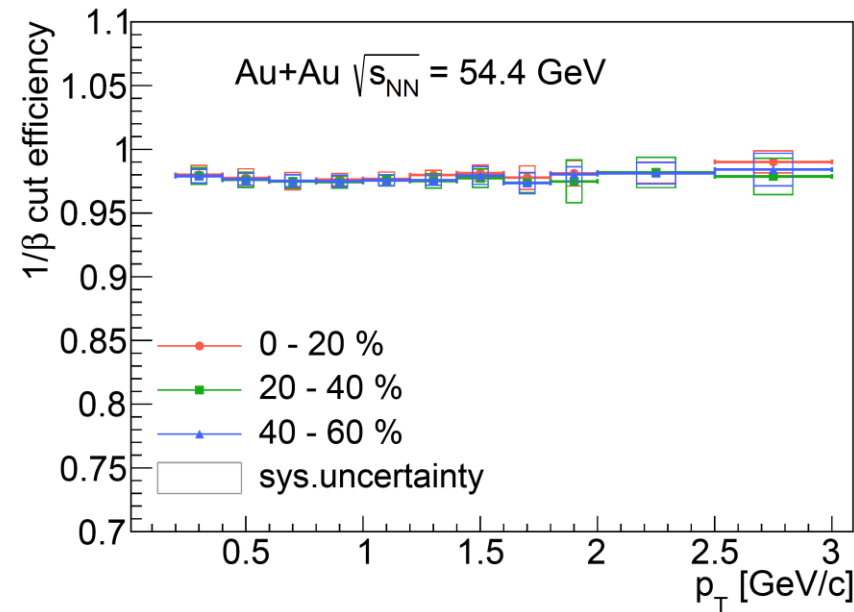


## Photonic electron yield



data

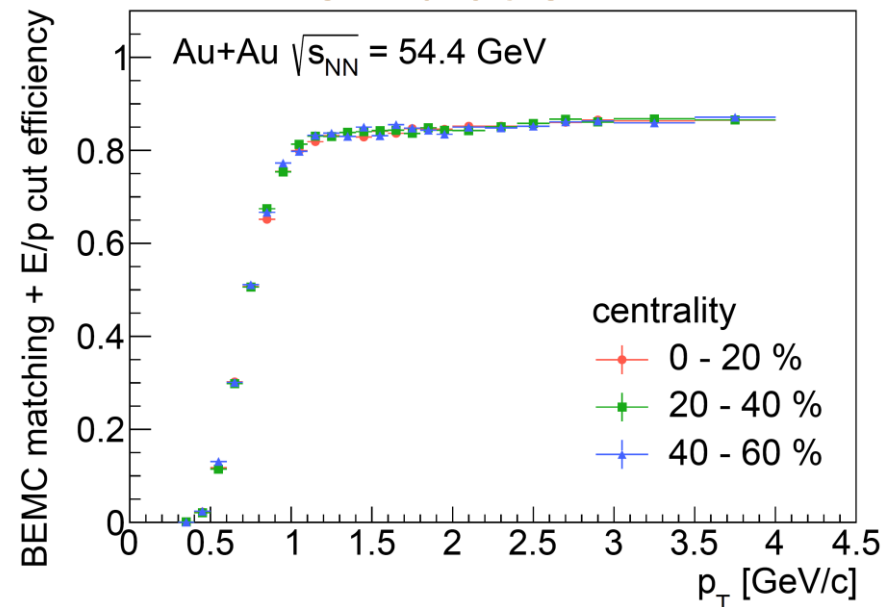
$\epsilon_{\text{total}}$



- 1/ $\beta$  cut
- $n\sigma_e$  cut
- TOF matching

Ongoing

## Simulation



- BEMC matching
- E/p cut
- TPC tracking



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