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

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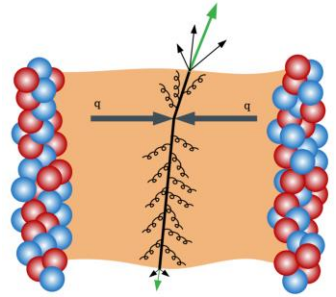
Motivation

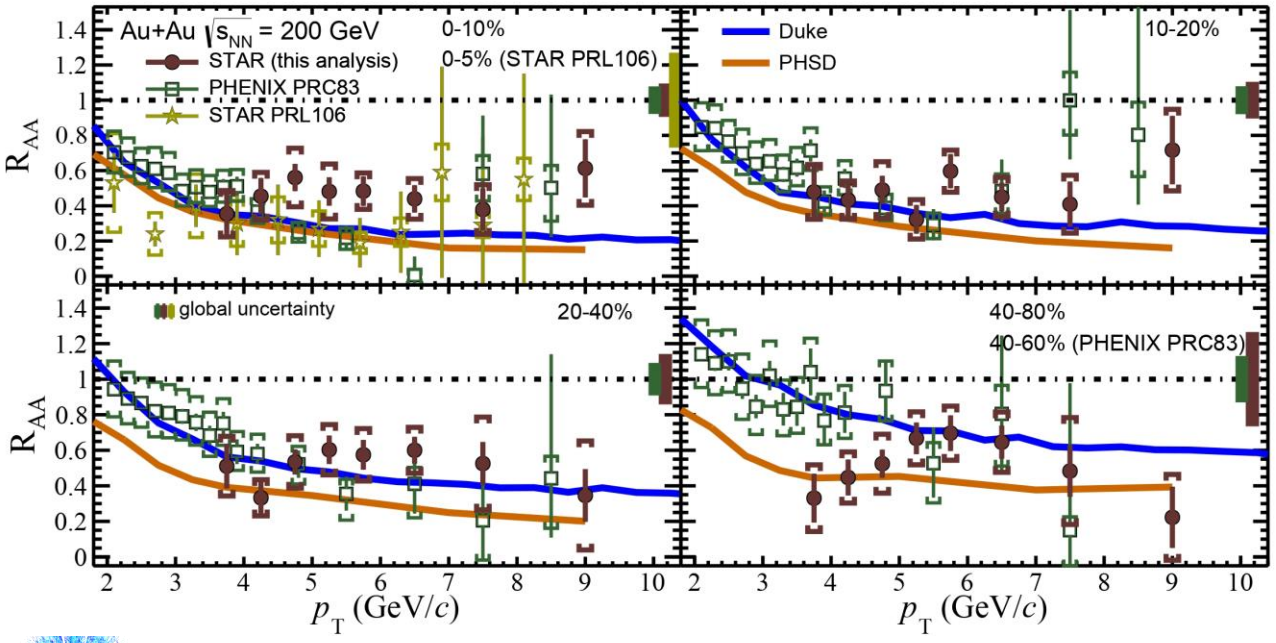
Heavy quarks

- Dominantly produced in initial hard scatterings
- Heavy quarks: $m_q >> \Lambda_{QCD}$, $m_q >> T_{QGP}$
- 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 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.

General idea of the analysis

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

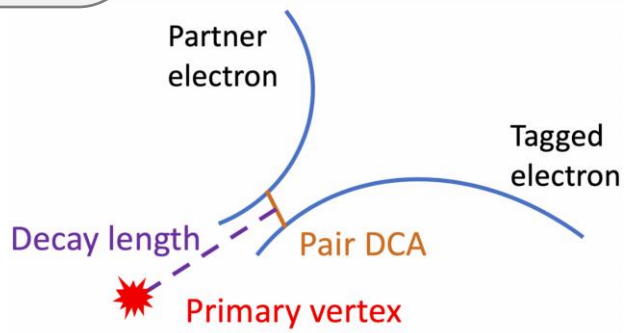
N_{NPE}

Photonic electron (PE) sources:
1. Dalitz decays ($\pi^0/\eta \to \gamma e^+ e^-$)
2. Gamma conversion ($\gamma \to e^+ e^-$, $\pi^0/\eta \to \gamma\gamma$)

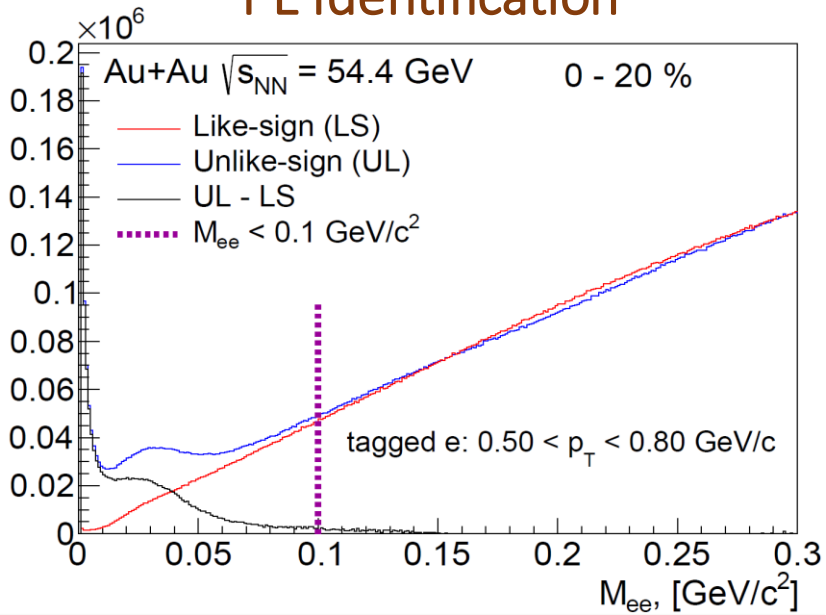
Hadron-decayed electrons (HDE):
- ρ, ω, ϕ
- J/ψ, Υ
- Drell-Yan
- K_{e3}

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

Ongoing + correction for HDE is planned



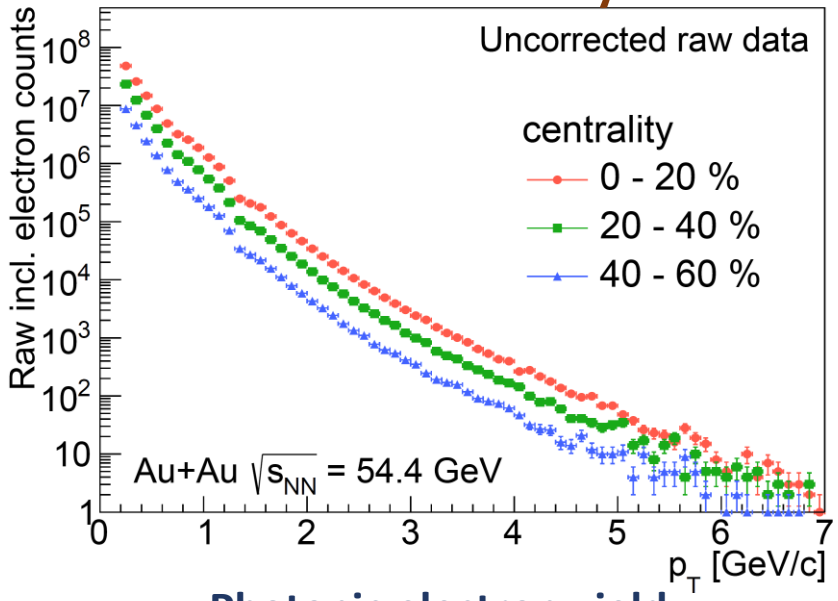
PE identification



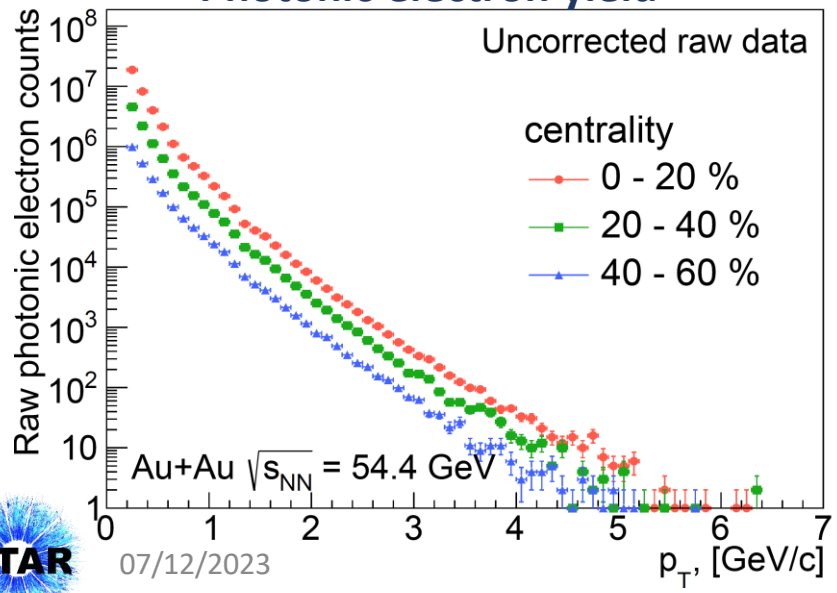
Results

Analysis ongoing in STAR

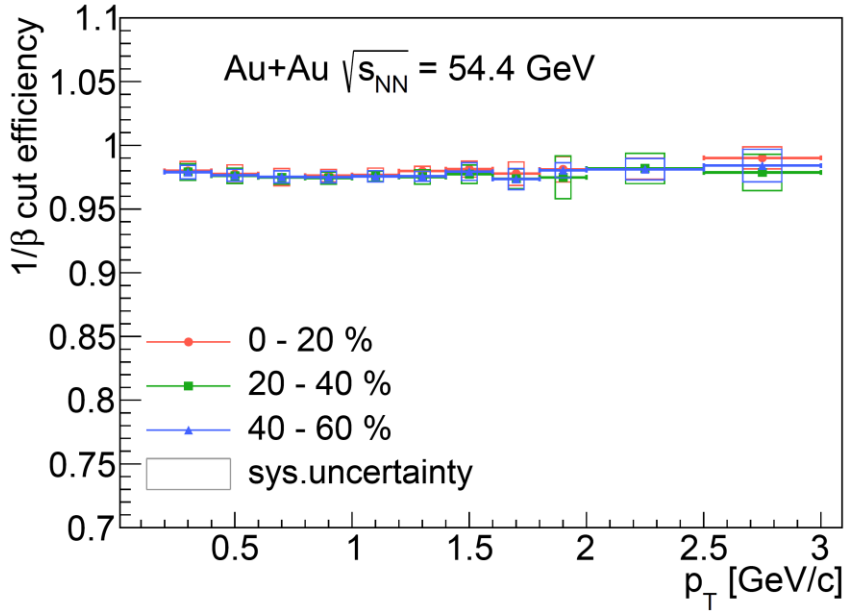
Inclusive electron yield



Photonic electron yield



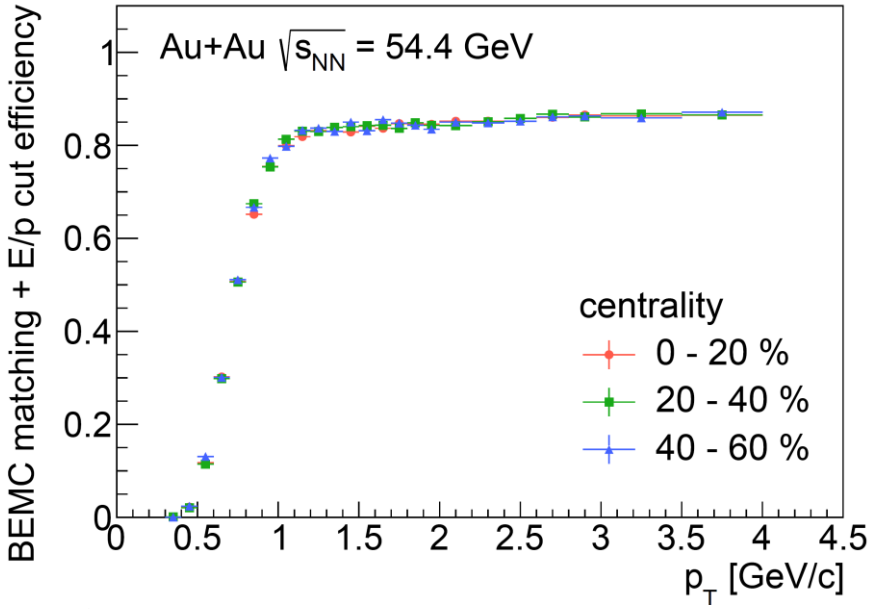
data



ε_{total}

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

Simulation



- BEMC matching
- E/p cut
- TPC tracking