QM2025 Debriefing

- $dN_{ch}/d\eta$ v.s $dN_{\gamma}^{dir}/d\eta$ (plenary and parallel talks)
  - Different measured yields between STAR and PHENIX. ALICE high-multiplicity pp result similar to STAR value; Different scaling behaviors from STAR and PHENIX measurement (i.e different extracted power of $dN_{\gamma}^{dir}/d\eta = A \times (dN_{ch}/d\eta)^{\alpha}$
  - "direct-photon puzzle" (?): theories couldn't not describe the photon yields and photon v_2 simultaneously
    - QGP + hadrons v.s pre-equilibrium + QGP + hadrons? → so this may not be a puzzle at all
- (I personally think it's interesting, not necessarily important physics) Dependence of $dN_{ch}/d\eta$ on the assumption of nuclear structure: typical assumption takes the Woods-Saxon form. An alternative assumption takes into account the α-cluster structure → significant difference in the $dN_{ch}/d\eta$
  - (This was presented in a poster but unfortunately I couldn't find the link to it)
- (What I dislike, or "bad/ugly" in my point of view) Theoretical talks that showed an disproportionate number of formulae as compared to how many experimental measurements the talk tried to connect to

QM2025 Debriefing

STAR - Universal scaling

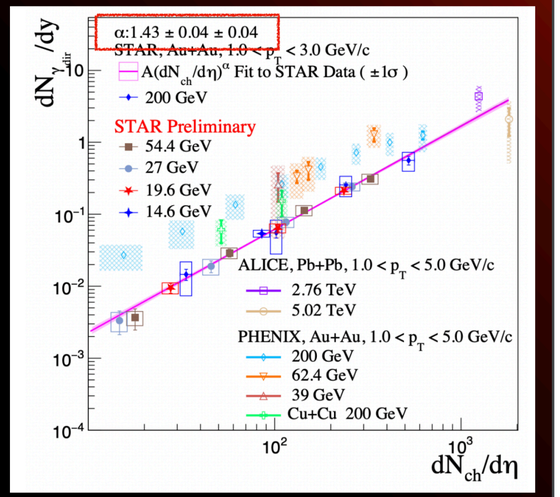
Talk: Xianwen Bao

Similar analysis performed by STAR with BES-II data

However:

→ Significant difference in direct photon yields between STAR and PHENIX

→ Slope of STAR (α = 1.43) data larger than PHENIX



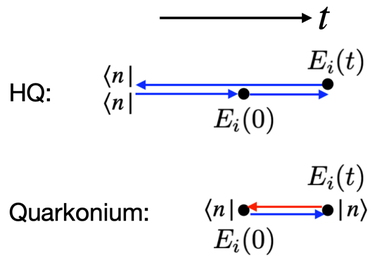
Sebastian Scheid, EM radiation in heavy-ion collisions 10

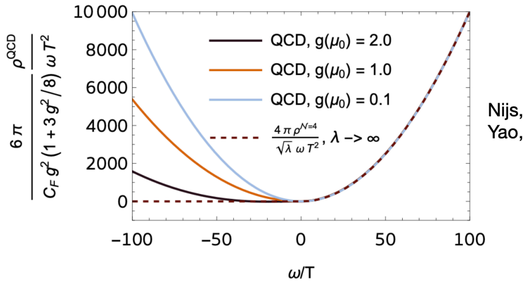
Q: Universal (or equivalent) definition of the physics objects across different experiments?

Chromoelectric Correlators for Heavy Quark and Quarkonium

- **HQ diffusion** $\kappa_{\rm fund} = \frac{g^2}{3N_c}{\rm Re}\int {\rm d}t\langle {\rm Tr_c}[U(-\infty,t)E_i(t)U(t,0)E_i(0)U(0,-\infty)]\rangle_{T,Q}$
- **Quarkonium** $\kappa_{\rm adj} = [g^{++}_{\rm adj}]^>(\omega=0) = \frac{g^2 T_F}{3N_c}\int {\rm d}t\langle E^a_i(t)\mathcal{W}^{ab}(t,0)E^b_i(0)\rangle_T$
- **Operator orderings are different;** evident difference seen in lattice calculation

Mayer-Steudte, PoS LATTICE2024 (2025) 205





Nijs, Scheihing, Yao, 2310.09325

Eller, Ghiglieri, Moore, 1903.08064; Binder, Mukaida, Scheihing, Yao, 2107.03945; Scheihing, Yao, 2205.04477, 2306.13127

18

Need new dynamical description to access strong coupling effect

IMHO: It is difficult to build intuition/picture