# Production Rates of Dileptons Constructed from a Non-Perturbative Quark Propagator

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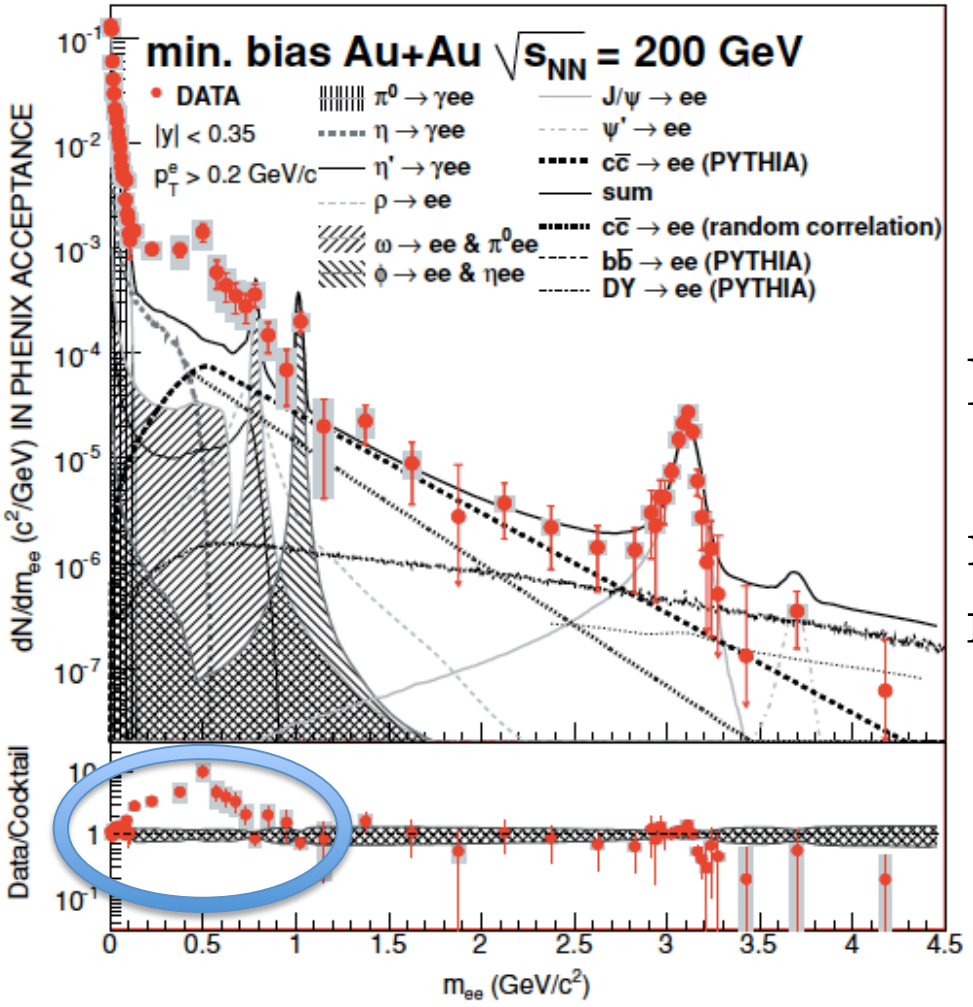
# Motivation




Large enhancement
at low mass region

- QGP is a candidate to explain low mass enhancement.
- It is desirable to evaluate non-perturbative contribution from strong QGP.

Use quark propagator calculated on the lattice

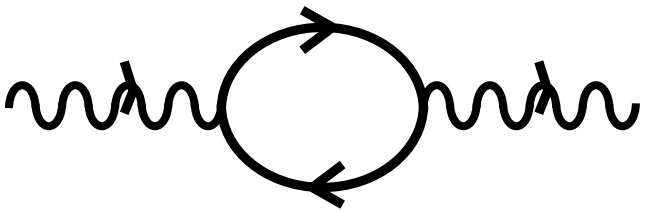
PHENIX Collaboration, Adare, *et al.* (2010)

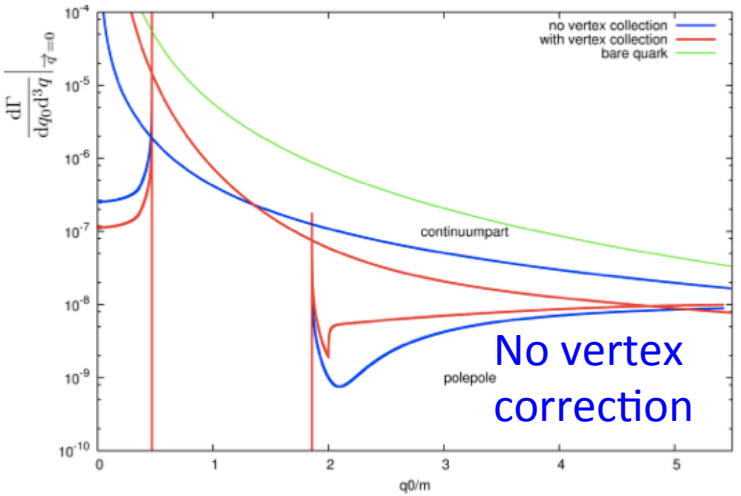
Dilepton production rates is obtained from $\Pi_{\mu\nu}$ by

$$\left.\frac{d^4\Gamma}{dq_0 d^3 q}\right|_{q=0} = \frac{\alpha}{12\pi^4}\frac{1}{e^{\beta q_0}-1}\frac{1}{(q_0)^2}\,\mathrm{Im}\,\Pi^{\mu}_{\mu}$$

McLerran, Toimela (1985); Weldon(1990); Gale, Kapusta (1991)

photon self energy at 1loop order in resummed perturbation theory

$\Pi_{\mu\nu} =$ 

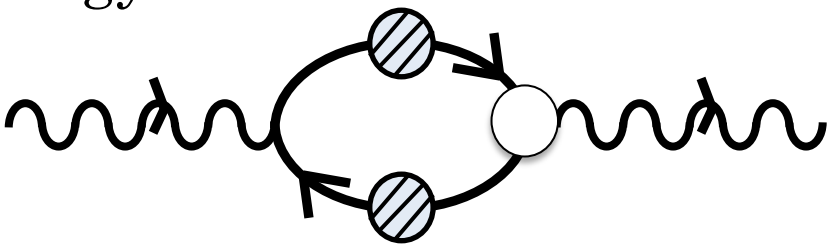



Braaten, Pisarski, Yuan (1990)

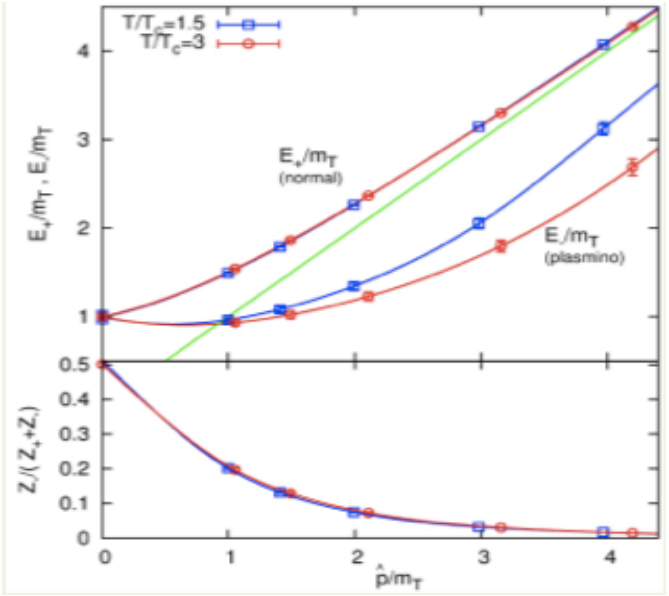
# Strategy

Full photon self energy:

$$\Pi_{\mu\nu} =$$



We calculate $\Pi_{\mu\nu}$ using quark propagator calculated on the lattice without vertex correction.

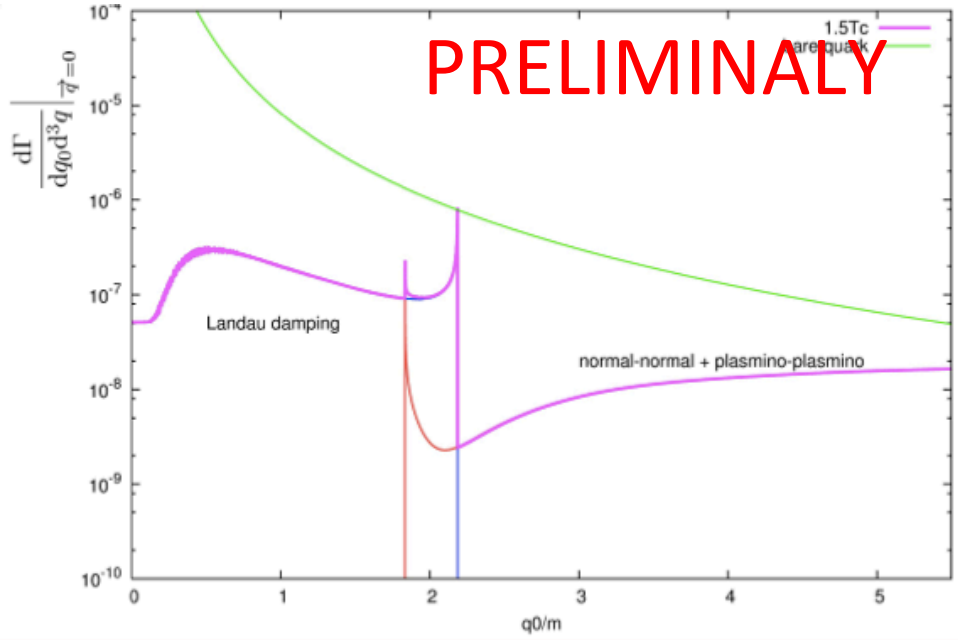



- quark-spectral function is calculated by 2-pole ansatz, without continuum part.
- dispersion function is interpolated by cubic spline interpolation.

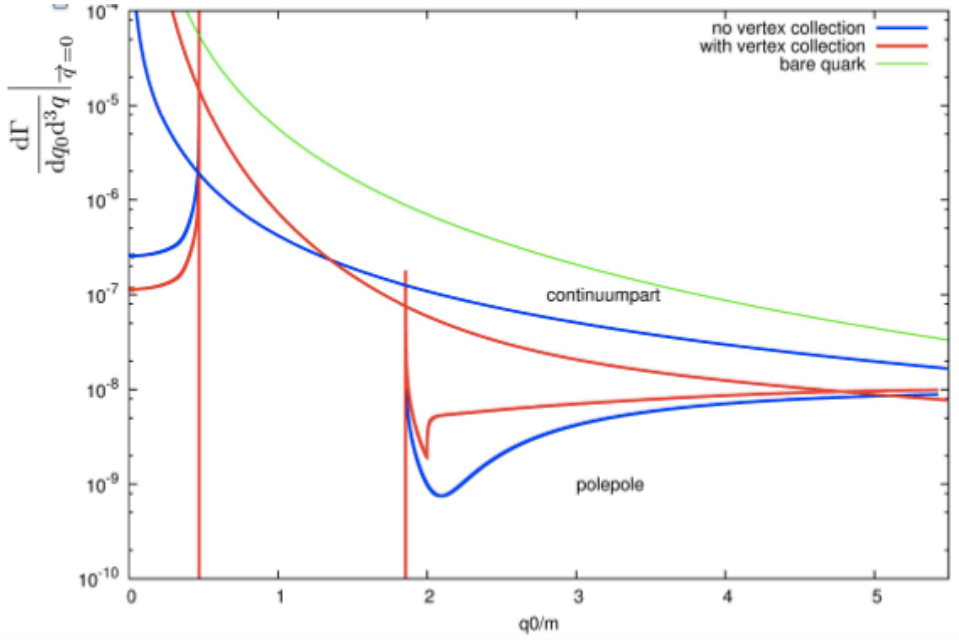
Lattice data from Karsch, Kitazawa (2009); Kaczmarek *et al.* (2012)

# Result

Our result (T=1.5Tc)




HTL




Enhancement owing to van Hove singularity appears around q0 ≈ 600MeV.

Tc ≈ 300MeV, $m_{thermal}$ ≈ 300MeV

Similar result for 3Tc