格子数値解析を利用した 非閉じ込め相のレプトン対生成率

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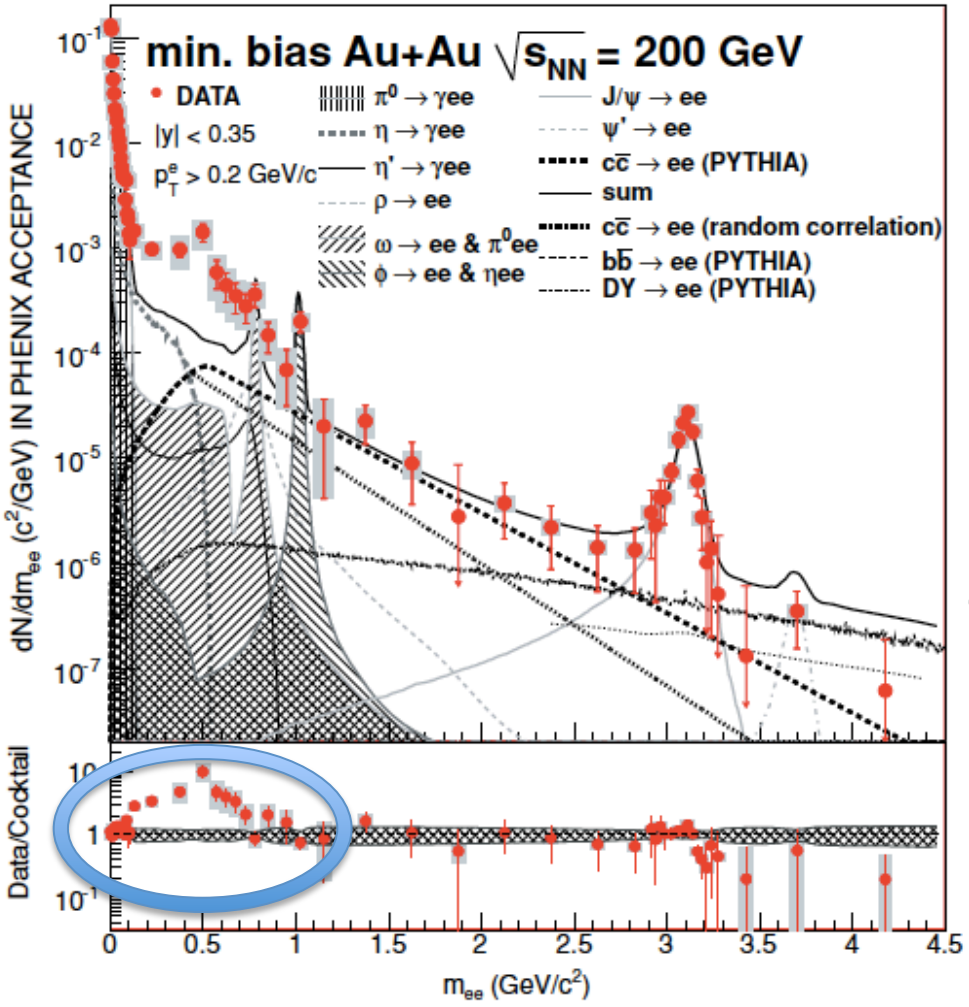
Dilepton production rate



Large enhancement
at low mass region

- QGP origin??
- It is desirable to evaluate the production rate from strongly-coupled QGP non-perturbatively.

Use quark propagator measured on the lattice

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

※ STAR reported different spectrum

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)

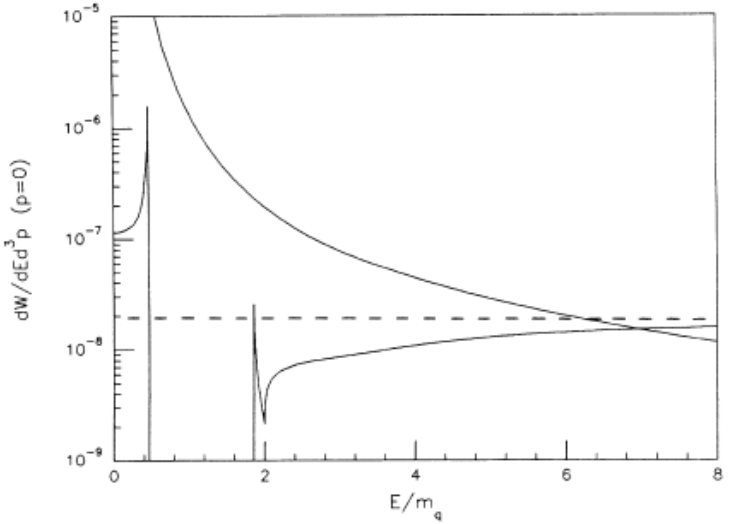
"Photon self energy"

Perturbative analysis

HTL quark propagator

HTL vertex

$\Pi_{\mu\nu}$ =

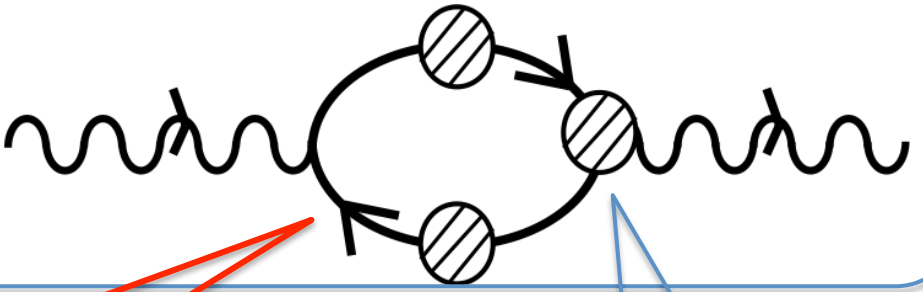


Braaten, Pisarski, Yuan (1990)

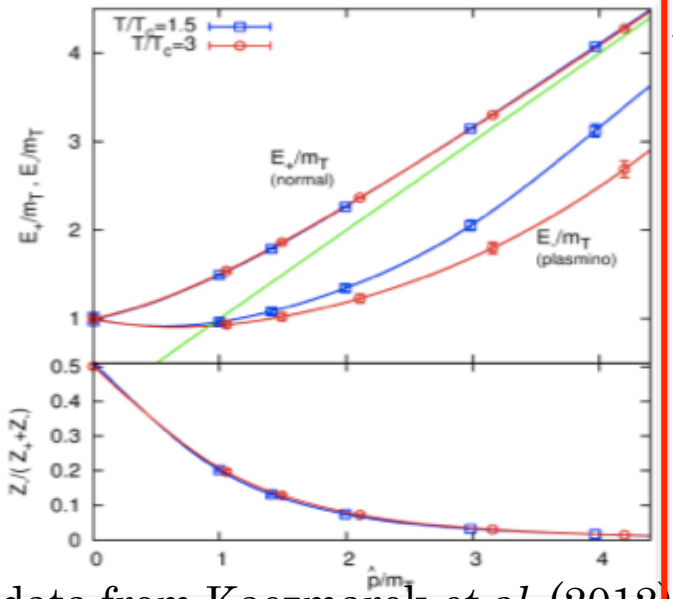
Strategy: use lattice quark propagator

Schwinger-Dyson equation:

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



Lattice quark propagator

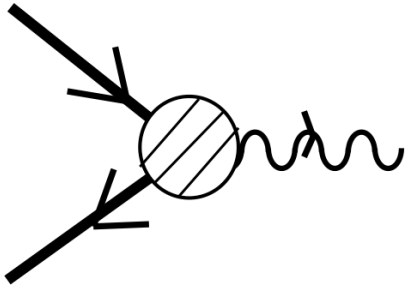


data from Kaczmarek *et al.* (2012)

W.T. identity

Determine the vertex

Photon-quark vertex



gauge invariant

Result

$T=1.5T_c$
$T_c=290\text{MeV}$
$m_T \sim 350\text{MeV}$

Rate

$$\left.\frac{d^4\Gamma}{dq_0 d^3q}\right|_{\vec{q}=\vec{0}}$$