Production of low-mass vector mesons via di-electron decay in $\sqrt{s_{NN}}$=200GeV p+p collisions at RHIC-PHENIX

Quark Physics Laboratory
Hiroshima University, Japan
広島大学

Kotaro M Kijima (Hiroshima University)
for PHENIX collaboration

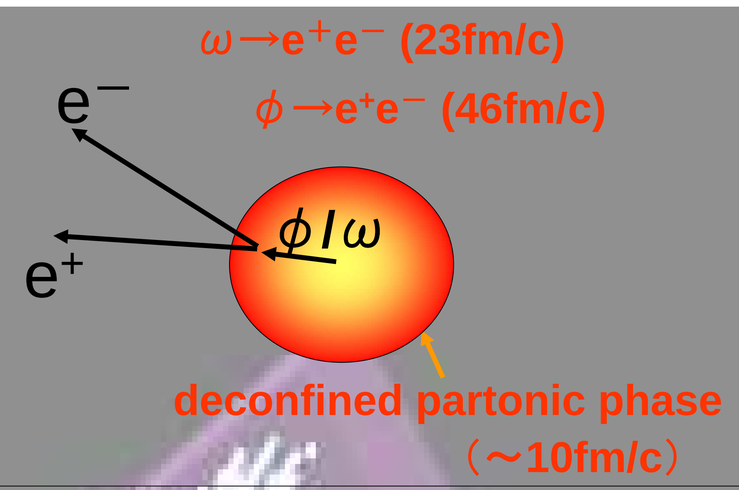
PHENIX

Motivation

Effective mass of quark in the deconfined partonic phase can be lower than in normal vacuum due to the effect of chiral symmetry restoration. The result of that, mass and life time of low mass vector mesons (ϕ, ρ, ω) may be modified. Study of mass modification is important topics to investigate the mechanism of generation of hadron mass.

method

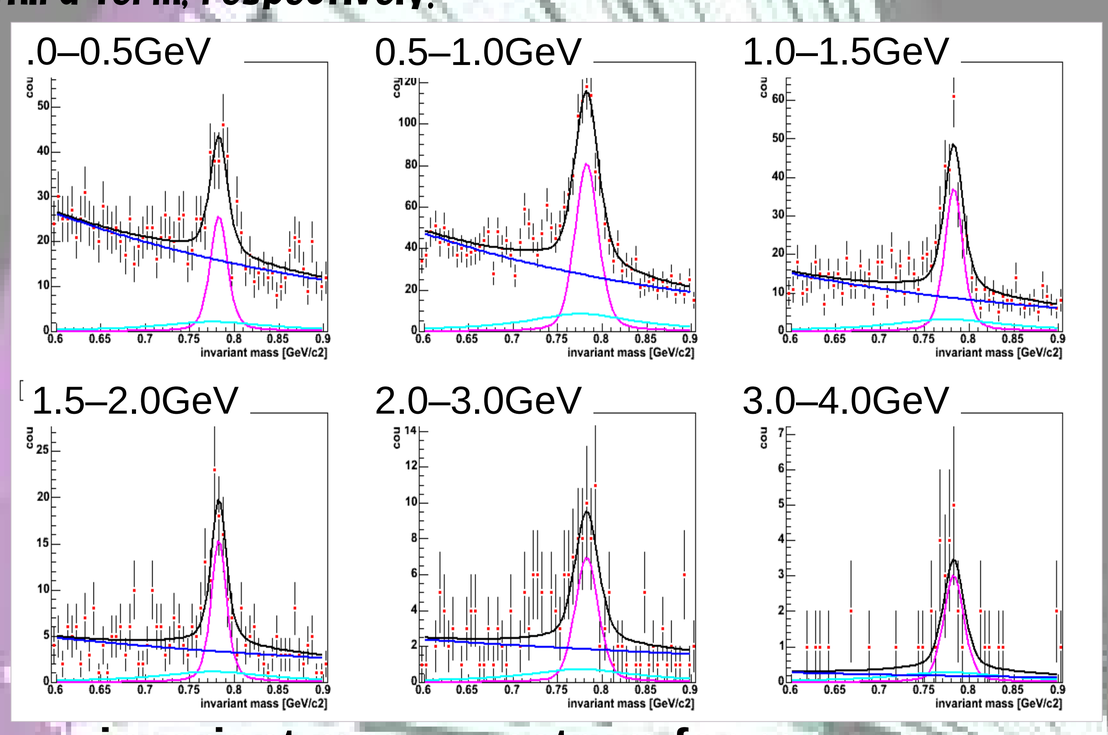
Deconfined partonic phase is expected to be created in high energy heavy ion collisions at RIHC. Electron do not interact strongly with the medium. The measurement of electron pairs from vector meson is therefore a good probe to study chiral symmetry restoration since electrons carry the original information from the deconfined partonic phase.



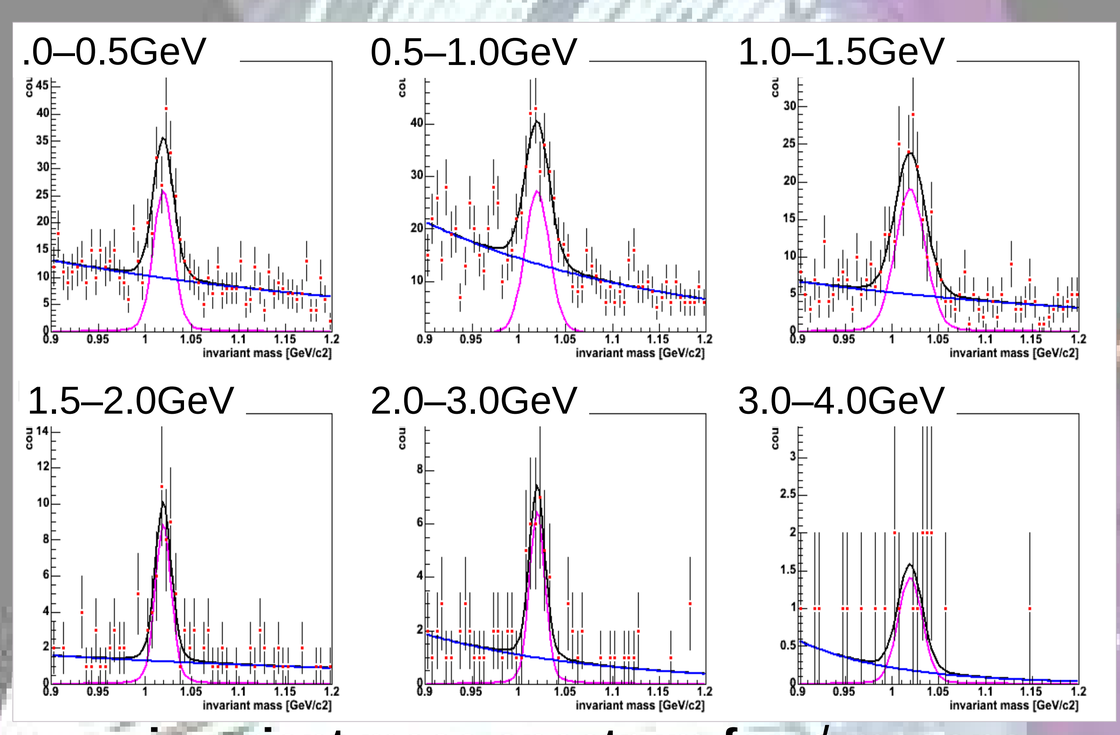
invariant mass spectra of electron positron pair divided pT bins

Fit function f = Gaussian convoluted relativistic Breit Wigner(GrBW) + Breit Wigner(BW) + exponential.

The first term is for ω and ϕ, second term is to estimate contamination of ρ and third term corresponds to combinatorial background. Mean and width of the first term is fixed at PDG. ω / ρ ratio is fixed to 1.53 from branching ratio. Black lines in the figure represent sum of all terms. Magenta and light blue and blue lines correspond to the first term, second term and third term, respectively.



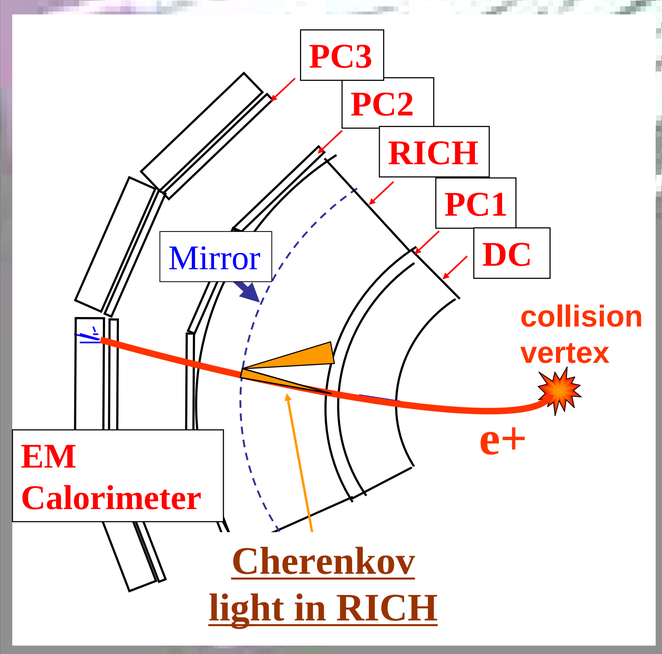
invariant mass spectrum for ω mesons



invariant mass spectrum for ϕ mesons

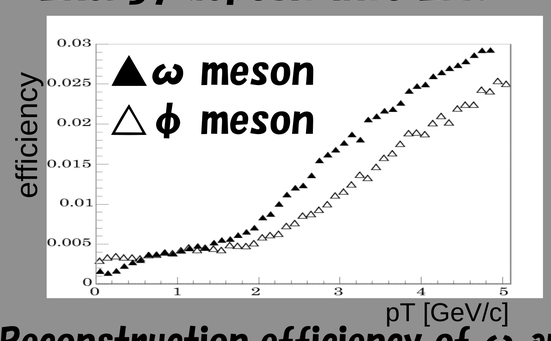
comparison of invariant mass spectrum between p+p and AuAu

measurement of electron at PHENIX



~ electron track ~
- DC, PC, EMC

~ electron identification ~
- Cherenkov light in RICH
- Energy deposit into EMC



Reconstruction efficiency of ω and ϕ meson including acceptance of the PHENIX spectrometer is shown as a function of pT.

summary

We could see the clear peak of ω and ϕ mesons on the invariant mass spectrum of electron and positron pair at p+p collisions. It will be a definite base line for the comparisons with Au+Au result. We will show it in near future.