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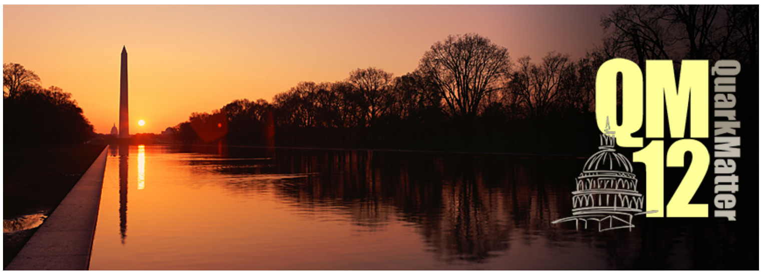


Contribution ID: **268** Type: **Oral Presentation**

# Di-electron differential cross section in Au+Au collisions at different beam energies at STAR

*Wednesday, 15 August 2012 09:10 (20 minutes)*

Di-leptons serve as clean and bulk penetrating probes to study the properties of the strongly interacting hot and dense medium created in heavy ion collisions. They are produced in all stages of the heavy-ion collisions and are not affected by strong interactions, hence can probe the entire evolution of the collision. Di-lepton production in the low mass range ($M_{ll} < 1.1$ GeV/$c^2$) allows the study of vector meson in-medium properties, an observable possibly connected to chiral symmetry restoration. In the intermediate mass region ($1.1 < M_{ll} < 3.0$ GeV/$c^2$), di-lepton measurements serve as a tool to extract the medium thermal radiation, which provides direct information on the temperature of the early system. Quantitative studies on these properties require systematic measurements of di-lepton production yields as well as elliptic flow as a function of invariant mass and transverse momentum ($p_T$). An extension of these studies to energy and centrality dependent measurements offer crucial information on how the system properties evolve with collision energies and system sizes. The STAR experiment, with its large and full azimuthal acceptance, clean electron identification over a wide momentum range and low material environment, is very well suited to carry out systematic studies on di-lepton production. In the years 2010 and 2011, more than one billion events were taken in 200 GeV Au+Au collisions and several hundred million events were recorded at lower energies by the STAR experiment. In this presentation, results from di-electron mass spectra as a function of $p_T$ and centrality as well as the dependence of elliptic flow on invariant mass in 200 GeV Au+Au collisions will be presented. The results on mass, width, dN/dy, $p_T$ spectra of $\omega$ and $\phi$ mesons will be reported. The first STAR results of di-electron mass spectra and $p_T$ distributions at midrapidity for Au+Au collisions at $\sqrt{s_{NN}}$ = 19.6, 39 and 62.4 GeV will be presented. These distributions will be compared to model calculations of in-medium vector and thermal radiation contributions to infer medium properties.

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**Session Classification:** Parallel 3C: Electro-Weak Probes (Chair J. Kapusta)

**Track Classification:** Electroweak probes