Abstract for an Invited Paper
for the HAW05 Meeting of
The American Physical Society

Measurements of J/Ψ and photons at RHIC

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Recent results on measurements of J/Ψ and photons are reported. In spite of fruitful results in the first four years of RHIC operation, there are still remaining questions to be answered to further characterize the state of matter formed at RHIC. In particular, direct information of deconfinement of quarks and gluons and of the dense matter produced has not been obtained, and should be provided. From this point of view, electro-magnetic probes are important. They created in the medium, and emerge from the matter without strong final state interaction. Thus, they carry direct information about conditions and properties of the medium. Especially, direct photons and lepton decays of J/Ψ are unique observables. They allow direct access to the initial state of the collision and information of deconfinement. The J/Ψ yield is considered to be one of the most promising probes of deconfined matter, since theoretical models predict that the J/Ψ yield could be suppressed due to the color Debye screening effect in QGP. On the other hand, recent theoretical efforts shows the possibility of the J/Ψ yield increasing due to the coalescence of uncorrelated c and $\bar{c}$ quarks. Also, a cold nuclear effects, such as nuclear absorption, may affect the final J/Ψ yield. Thus, the detailed study of J/Ψ yield in several kinds of collisions is important. We present the latest results of J/Psi invariant yield and J/Psi pT distribution obtained by using its lepton decay mode in p+p, d+Au, and Au+Au collisions at RHIC. In addition to information from J/Psi measurements, information from photon measurements is obtained at RHIC. the PHENIX discovery of a large photon excess over the meson-decay background in central Au+Au collisions at high pT confirms the final-state nature of the high-pT hadron suppression previously observed. We present a systematic study of direct photon production in p+p, d+Au, and Au+Au collisions.