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## Nuclear matter effects on $J/\psi$ production in Cu+Au and $U+U$ collisions in PHENIX

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The Phenix experiment at RHIC has produced high quality  $J/\psi$  measurements in heavy ion interactions for various energies and collision systems. These measurements allow us to study the mechanisms which may modify the charmonium production in the nucleus.

During 2012 run, the flexibility of the RHIC to provide collisions with different nuclei have led to the first experimental study of two new collision systems with unique initial collision geometries. The initial asymmetry of the Cu+Au system leads to differences in the  $J/\psi$  suppression along the beam axis. The Phenix detector, with its extensive kinematic coverage, is well suited to measure the  $J/\psi$  production in both forward and backward rapidities,  $-2.2 < y < -1.2$  and  $1.2 < y < 2.2$ . Such studies, along with a comparison to the  $d$ +Au and Au+Au systems, provide insight into the interplay of cold and hot nuclear matter on the  $J/\psi$  modification, and whether such effects could be factorized. The second system,  $U+U$ , extends further the maximum energy density reached in heavy ion collisions at RHIC and presents the possibility to study how this increase may alter the particle production.

In this talk I will present results from Cu+Au and  $U+U$  collision systems, focusing on the latest  $J/\psi$  measurements from Phenix.

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