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PHENIX charmonia: what have we learned?

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PHENIX has good quality measurements from Au+Au, Cu+Cu, p+p and d+Au collisions, and the analysis of data from Cu+Au and U+U collisions is nearing completion. The analysis of charmonium data from the 2008 d+Au run has recently been completed, and this talk will focus on what we have learned from the d+Au data about the mechanisms that modify charmonium production in a nucleus.

The d+Au charmonium data from PHENIX consist of 1) J/psi modification versus centrality across the full PHENIX rapidity range, and 2) psi' data at midrapidity only. Both show unexpected features. The J/psi modification at forward rapidity requires a stronger than linear dependence of suppression on nuclear thickness, while the psi' suppression for central collisions is unexpectedly stronger than that for the J/psi. There will be a discussion of the implications of the rapidity dependence and of the centrality dependence, and also of why we believe that the centrality measurement is reliable.

It has long been assumed that that p(d)+A data provide the baseline for measuring hot nuclear matter effects in A+A collisions by isolating the "cold nuclear matter" effects. However recent results from p+Pb at the LHC and d+Au at RHIC show correlations of soft particles across large rapidity gaps that are consistent with flow. This raises the possibility that there are hot matter effects in d+Au collisions that may affect charmonium production, and evidence for and against
this will be discussed.

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