PHYSICS SEMINAR

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Validation of the Glauber Model in Asymmetric Heavy Ion Collisions in PHENIX

Abstract

Effects of strong nuclear force on collisions are studied by comparing them to p+p collisions. An important experimental observable is the nuclear modification factor (R_{AB}). This is defined as

$$R_{AB}(P_t) = \frac{(\frac{d^2N}{P_t dP_t d\eta})_{AB}}{N_{bin} * (\frac{d^2N}{P_t dP_t d\eta})_{pp}} = \frac{Y(AB)}{N_{bin} * Y(pp)}$$

where Y(AB) is the yield of particle production in A+B collision, Y(pp) is the yield of particle production in p+p collision and N_{bin} is the number of binary collisions in heavy ion systems. One of the strongest evidence of formation of Quark Gluon Plasma (QGP) in heavy ion collisions is the suppression of R_{AB} of π^0 and the absence of suppression in direct photons. In recent years there has been growing evidence that indicate towards a possible formation of QGP even in small systems like p/d+Au collisions. Similar to Au+Au, the π^0 yield was suppressed in central, but, unlike in Au+Au, it was enhanced in peripheral collisions. There is no known physics mechanism to explain such enhancement. Instead of hypothesizing about new physics, my analysis asks a different question first: is the centrality classification and the Glauber model, as used in Au+Au, still valid in those very asymmetric heavy ion collisions? In this talk, I will be presenting my thesis work on High Pt, direct photon in d+Au collision to answer the above question.

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