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Measurements of neutral pions and direct photons in 3He+Au collisions

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As a part of the studies of the small systems (p, d, and ^{3}He + Au), in this poster we present the preliminary yields of π^0 and direct γ for the $\sqrt{s_{NN}}$ = 200 GeV ^{3}He + Au PHENIX data, as well preliminary nuclear modification factor (R_{xA}) for this system. We will discuss the unfolding procedure to obtain such yields from raw data in a way to account for p_T migration as well as correct for detector acceptance and efficiency. For the nuclear modification factor, we employ the double ratio $R_{xA} = (\gamma^{dir}/\pi^0)_{pp}/(\gamma^{dir}/\pi^0)_{xA}$ which can be shown to be analytically equivalent to the regular expression for R_{xA}, but using an experimentally determined metric for the number of binary collisions ($N_{coll}^{exp} = \gamma_{xA}^{dir}/\gamma_{pp}^{dir}$). As we will show, using this ratio has the advantage of canceling systematic uncertainties that are present in both $p+p$ and ^{3}He + Au collisions (such as the reduced production of high p_T pions and γ^{dir} due to cold nuclear matter effects and uncertainties due to the $p + p$ cross section), as well as detaching the nuclear modification factor from the Glauber model, thus minimizing biases on centrality determination which are particularly relevant for the studies of small systems.

Category

Experiment

Collaboration (if applicable)

PHENIX

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