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## Validation of the Glauber Model for centrality determination in small system collisions

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The RAA of pions in small system collisions like p/d/He+Au at high  $p_T$  show suppression in central collisions and enhancement in peripheral collisions. Although the suppression can be understood by probable formation of Quark Gluon Plasma (QGP) in central collision, there is no known physics mechanism to understand the observed enhancement.

As direct photons are transparent to the QGP and thus travel unaffected through them, its RAA at high  $p_T$  will be unity in all centrality classes. Any deviation from this will shed light on the observed centrality dependent trend in RAA of  $\text{Pi}0$ s and thus could help us detangle true final state effects on these collisions.

In this talk, we show that the centrality binned RAA of direct photons show similar trends of suppression and enhancement as RAA of  $\text{Pi}0$ s for all centralities except the events with the highest multiplicity. This indicates that the centrality determination is biased affecting both  $\text{Pi}0$ s and direct photons. We also show a new way to define the RAA of  $\text{Pi}0$ s using the RAA of direct photons, thus removing any dependence on the Glauber Model. By this new definition, we note that there appears to be suppression in events with high multiplicity, which indicates final state effect on the  $\text{Pi}0$  production.

### Preferred track

Jets & QCD at High Scales

### Subfield

Nuclear experiment

### Attending in-person?

Yes

### On behalf of collaboration?

PHENIX Collaboration

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