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## Measurement of high pT direct photon and neutral pions in small collision systems at PHENIX

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Collective effects like elliptic and triangular flow have been observed in small system collisions and found to be consistent with the formation of quark-gluon plasma (QGP) droplets. Corresponding changes in the nuclear modification factor,  $R_{xA}$  however, became controversial, because they depend on certain model assumptions when mapping event activity on collision geometry. Using direct photons as “standard candle”, i.e. assuming that  $R_{xA}^{\gamma^{dir}} = 1$  holds for any system at high transverse momenta, the PHENIX experiment introduced a new  $R_{xA}$  based solely on experimentally measured quantities. In the highest event activity  $d+Au$  collisions this new double ratio  $R_{xA,EXP}^{\pi^0} = (\gamma^{dir}/\pi^0)_{pp}/(\gamma^{dir}/\pi^0)_{xA}$  still shows a 20% suppression of the  $\pi^0$  production. By comparing to recent results in other systems and collision energies, as well as to model calculations we will examine whether and how the role of final state (QGP) and initial state effects on this observation can be disentangled.

### Category

Experiment

### Collaboration

PHENIX

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