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Low p_T direct photon results with PHENIX and their bearing on the direct photon puzzle

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Despite decades of theoretical and experimental achievements, a coherent picture of the evolution in colliding heavy ion systems is still missing, particularly in the non-perturbative regime. Since photons are penetrating probes, the combined information of direct photon yields at low transverse momenta (p_T) and their azimuthally asymmetric emission (flow) provides important constraints on theories. Simultaneous observation of high yields and significant (almost hadron-like) flow of low p_T direct photons in Au+Au collisions by PHENIX, dubbed the “direct photon puzzle” still eludes a coherent explanation. A closely related issue is the apparent universality of photon production, that depends only on charged particle multiplicity, but not on the size of the colliding ions, except for the most asymmetric systems. In this talk, we will present new results on direct photon flow in Au+Au and yields in Au+Au, Cu+Au and $^3\text{He}+\text{Au}$ at low p_T . Also, we will discuss their impact on our current understanding of the various phases of heavy-ion collisions.

Category

Experiment

Collaboration (if applicable)

PHENIX

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