Contribution ID: **371** Type: **Poster**

Universal Scaling of Low Momentum Direct Photon Production in Relativistic Heavy Ion Collisions

Tuesday, 15 May 2018 19:10 (30 minutes)

Direct photons are an important tool with unique capabilities to study the colored medium created in (ultra)relativistic heavy ion collisions. We map out the low momentum direct photon observables and present the results of the measurements in Au+Au collisions at $\sqrt{s_{NN}} = 62.4$ GeV and $\sqrt{s_{NN}} = 39$ GeV, using data samples of externally converted photons. These results are aimed to further constrain the sources of the low momentum direct photons, in addition to the previous PHENIX measurement results at $\sqrt{s_{NN}} = 200$ GeV. The observed direct photon excess yield at these three collision energies can be interpreted as an evidence of thermal radiation from the Quark Gluon Plasma.

We have found that at low-p_T the yield of direct photons, dN_γ/dy, from heavy ion collisions follows a universal scaling as a function of the charged-particle multiplicity $(dN_{ch}/d\eta)^\alpha$, where we combine the data from various collision systems at four center-of-mass energies. The prompt photon yield seems to have the similar functional behavior. The observed scaling properties of direct photons from these systems show that the strength of the thermal radiation source increases faster than the charged-particle multiplicity. In this poster we present these new results.

Content type

Experiment

Collaboration

PHENIX

Centralised submission by Collaboration

Presenter name already specified

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Session Classification: Poster Session

Track Classification: Electromagnetic and weak probes