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Low pT photon spectra and flow in Au+Au at PHENIX

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Direct photons, as electromagnetic probes that do not interact strongly with the medium, provide a unique insight into the properties of quark-gluon plasma formed in high-energy heavy-ion collisions. The PHENIX experiment at RHIC has performed a detailed analysis of the direct-photon spectrum from Au+Au collisions at √sNN = 200 GeV, utilizing the external-photon-conversion technique for a centrality range of 0% - 93% and a transverse-momentum (pT) range of 0.8 to 6.0 GeV/c. An excess of direct photons, above prompt-photon production from hard-scattering processes, is observed for pT < 6 GeV/c. This nonprompt direct-photon component is measured by subtracting the prompt contribution -which is estimated from Ncoll-scaled direct photons in p+p collisions at 200 GeV- from the direct-photon spectra, with a large azimuthal anisotropy and a characteristic dependence on collision centrality. The results indicate an increasing inverse slope from ≈ 0.2 to 0.4 GeV/c with increasing pT, suggesting sensitivity to photons from early collision stages. The pT-integrated nonprompt direct-photon yields follow a power-law scaling with collision system size, with an exponent $\alpha \approx 1.1$, independent of pT. Additionally, the inverse slope of the spectrum shows no dependence on system size. These findings will be discussed in detail, highlighting their implications for understanding quark-gluon plasma properties.

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