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Differential pi0 and photon modification in d+Au collisions

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Experiments at RHIC and LHC have found no observable evidence of jet quenching in small systems, with one exception —a recent measurement by PHENIX [2303.12899], which compared the yield of neutral pion and direct photon production in very central d+Au collisions. The argument is that the photon yields can be used to correct out any centrality bias effects, and thus the surprisingly strong signal observed by PHENIX in the pi0 measurement is attributable mainly to jet quenching. In a recent paper [2404.17660], I argue that the particular photon and pion events selected by PHENIX arise from proton configurations with significantly different Bjorken-x distributions, and thus are subject to different magnitudes of centrality-dependent modification from initial-state color fluctuation effects. Using the results of a previous global analysis of RHIC and LHC data [1709.04993], with no additional parameters or re-tuning, I show that potentially all of the pion-to-photon difference in PHENIX data can be described by a proton color fluctuation picture at a quantitative level before any additional physics from final-state effects is required. This finding reconciles the interpretation of the PHENIX measurement with others at RHIC and LHC into a consistent picture across experiments, in which there are strong constraints on the possible amount of jet quenching in small systems.

Category

Experiment

Collaboration

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