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The Fox-Wolfram Moment of jet production in relativistic heavy ion collisions

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We present the first theoretical investigation of Fox-Wolfram moments (FWMs) for multi-jet production in relativistic heavy ion collisions. In this work, jet productions in p+p collisions are computed with a Monte Carlo event generator SHERPA, while the Linear Boltzmann Transport model is utilized to simulate the multiple scattering of energetic partons in the hot and dense QCD matter. The event-normalized distributions of the lower-order FWM, H_1^T in p+p and Pb+Pb collisions are calculated. It is found that for events with jet number $n_{\rm jet} = 2$ the H_1^T distribution in Pb+Pb is suppressed at small H_1^T while enhanced at large H_1^T region as compared to p+p. For events with $n_{\rm jet} > 2$, the jet number reduction effect due to jet quenching in the QGP decreases the H_1^T distribution at large H_1^T in Pb+Pb relative to p+p. The medium modification of the Fox-Wolfram moment H_1^T for events with $n_{\rm jet} \geq 2$ are also presented, which resemble those of events with $n_{\rm jet} = 2$. Its reason is revealed through the relative contribution fractions of events with different final-state jet numbers to H_1^T

Primary author: KONG, Wei-Xi (Central China Normal University)

Co-author: ZHANG, Ben-Wei (Central China Normal University)

Presenter: KONG, Wei-Xi (Central China Normal University)

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