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New toy model simulation for elucidating the parton energy loss mechanism depending on path-length within the quark-gluon plasma medium

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The purpose of this study is to elucidate the parton energy loss mechanism depending on path-length within the quark-gluon plasma (QGP) medium. In relativistic heavy ion collision experiments, it is difficult to directly observe the QGP because of its short life time and small size. Detecting a high momentum parton which passes through the QGP provide information of the QGP properties via the energy loss of the parton. The parton is detected as a jet and the parton energy loss is measured as the jet suppression. In general, there are two ways of measuring the jet suppression: the jet nuclear modification factor ($R_{\mathrm{AA}}^{\mathrm{jet}}$) and the jet emission azimuthal anisotropy (v_2^{jet}). Each independent measurement of the $R_{\mathrm{AA}}^{\mathrm{jet}}$ or v_2^{jet} has not clarified the parton energy loss mechanism.
Thus, we devised and developed a new simulation with parton energy loss models ($\Delta E = CL^n$), which the C is an arbitrary coefficient, the L is the path-length, and the n is a model dependent parameter. In this simulation, using the measured jet yield p_{T} distributions as input, it can provide the $R_{\mathrm{AA}}^{\mathrm{jet}}$ or v_2^{jet} and quantify the C and L.
In this presentation, we will show the comparison of the simulation results with the measured results by the LHC-ALICE experiment and the values of the C and L determined by this simulation.

Category

Experiment

Collaboration

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