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Bayesian inference of the magnetic field and chemical potential on holographic jet quenching in heavy-ion collisions

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Jet quenching is studied in a background magnetic field and a finite baryon chemical potential. The production of energetic partons is calculated using the next-to-leading order (NLO) perturbative Quantum Chromodynamics (pQCD) parton model, while the parton energy loss formula is obtained from the AdS/CFT correspondence incorporating the magnetic field and baryon chemical potential effects. Using Bayesian inference, we systemically compare the theoretical calculations with experimental data for the nuclear modification factor R_{AA} of the large transverse momentum hadrons in different centralities of nucleus-nucleus collisions at 0.2, 2.76 and 5.02 TeV, respectively. The form of the holographic calculation leads to a strong negative correlation between the magnetic field and the chemical potential for a fixed amount of energy loss. This degeneracy can also be observed after the model calibration. Finally, we discussed the sensitivity of jet quenching phenomena to the enteral magnetic field and a background baryon chemical potential.

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