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An equation-of-state-meter of QCD transition from deep learning with (2+1)-D relativistic viscous hydrodynamics coupled to a hadronic cascade model

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Supervised learning with a deep convolutional neural network (CNN) is used to identify the QCD equation of state (EoS) employed in event-by-event (2+1)-D relativistic viscous hydrodynamics coupled to a hadronic cascade afterburner" simulations of heavy-ion collisions from the simulated final-state pion spectra $\rho(p_T, \phi)$. High-level correlations of $\rho(p_T, \phi)$ are learned by the neural network, which acts as an effectiveEoS-meter" in distinguishing the nature of the QCD transition. The EoS-meter is robust against many simulation inputs, such as shear viscosity, freeze-out temperature, equilibration time and collision energy. Thus the EoS-meter provides a powerful tool as the direct connection of heavy-ion collision observables with the bulk properties of QCD.

Content type

Theory

Collaboration

Centralised submission by Collaboration

Presenter name already specified

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