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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 effective EoS-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

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**Authors:** DU, Yilun (Frankfurt Institute of Advanced Studies, Goethe University Fran); ZHOU, Kai (FIAS, Goethe-University Frankfurt am Main); PANG, LongGang (Lawrence Berkeley National Laboratory); MOTOR-NENKO, Anton (Frankfurt Institute for Advanced Studies); SU, Nan (Frankfurt Institute for Advanced Studies); Dr STEINHEIMER, Jan; STOECKER, Horst (GSI); WANG, Xin-Nian (Lawrence Berkeley National Lab. (US)); ZONG, Hong-shi (Nanjing University)

**Presenter:** DU, Yilun (Frankfurt Institute of Advanced Studies, Goethe University Fran)

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