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Entanglement Entropy in a holographic model for the QCD critical point

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We study a holographic Einstein-Maxwell-dilaton model, which is adjusted to lattice QCD data for 2+1 flavors and physical quark masses for the equation of state and quark number susceptibility at zero baryo-chemical potential, to explore the resulting phase diagram over the temperature-chemical potential plane. A first-order phase transition sets in at a temperature of about 112 MeV and a baryo-chemical potential of 612 MeV. We estimate the accuracy of the critical point position by considering different low-temperature asymptotics for the second-order quark number susceptibility and characterize the phase transition by analyzing the critical pressure and behavior of isentropes.
In addition, we calculate the holographic entanglement entropy for this model and compare its phase diagram to that of the thermodynamic entropy and find a strong agreement in the vicinity of the critical point. Thus, the holographic entanglement entropy qualifies to characterize different phase structures. The scaling behavior near the critical point is analyzed through the calculation of critical exponents.

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