

Exploring percolation phase transition in the three-dimensional Ising model with machine learning

Thursday, 21 November 2024 09:50 (20 minutes)

The QCD critical point is suggested to be in the same universality class as the 3D Ising model, which implies that the behavior of thermodynamic observables near the QCD critical point can be described by the critical exponents and scaling laws of the Ising model. The percolation study offers valuable insights into the characteristics of phase transition, revealing the underlying mechanisms that govern the formation of global connectivity within the system. We explore the percolation phase transition in the 3D cubic Ising model by employing two machine learning techniques. Our results demonstrate the effectiveness of machine learning methods in distinguishing different phases during the percolation transition. Through the finite-size scaling analysis on the output of the neural networks, the percolation temperature and a correlation length exponent in the geometrical percolation transition are extracted and compared to those in the thermal magnetization phase transition within the 3D Ising model. These findings provide valuable insights essential for enhancing our understanding of the QCD phase transition.

Primary authors: 郭, 冉冉 (CCNU); 李, 笑冰; 李, 治明 (CCNU); 吴, 元芳 (CCNU)

Presenter: 郭, 冉冉 (CCNU)

Session Classification: Thursday Morning First Session