

Studying Additional Third-Order Transitions in the Two-Dimensional Ising Model via Machine Learning

ID: INV18

Invited Talk

Aug. 24, 14.00 - 14.30

Pham Long Nhat,¹ Nguyen Van Viet Hoang,¹ Nguyen Duc Dung,¹ Vu Hai,² Hoang Van Nam,² Duong Xuan Nui,¹ and Dao Xuan Viet^{1,†}

¹ School of Material and Engineering, Hanoi University of Science and Technology, Hanoi, Vietnam

² School of Electrical and Electronic Engineering, Hanoi University of Science and Technology, Hanoi, Vietnam

Email: viet.daoxuan@hust.edu.vn

We study the phase transitions of the two-dimensional (2D) Ising model using machine learning techniques. The 2D Ising model, a cornerstone of statistical mechanics, is known for its well-documented second-order ferromagnetic-paramagnetic phase transition. Recent studies have suggested the presence of additional third-order ferromagnetic-ferromagnetic transitions within the ferromagnetic phase and another third-order transition within the paramagnetic phase. To further investigate these complex phenomena, we apply machine learning methods to analyze the phase transitions in the 2D Ising model. Our approach facilitates the identification and characterization of these transitions, providing deeper insights into the critical behavior of the 2D Ising model.

Keywords: Ising model, Machine learning, Third-order phase transition