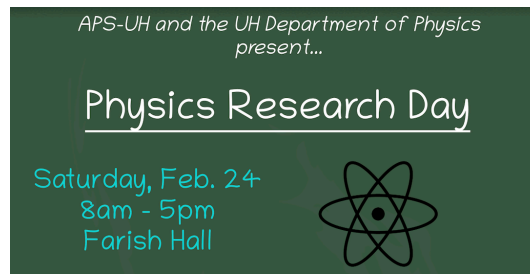


UH Physics Research Day - 2024



Contribution ID: 5

Type: **Talk**

Machine Learning Approaches for Phase Transition Recognition in Statistical Models

Saturday 24 February 2024 14:12 (12 minutes)

We apply Machine Learning (ML) and Deep Learning (DL) techniques to the classification of phase transitions in statistical models, with a focus on binary classification. Our goal is to test whether a classification is possible based on configurations only, without the need of calculating an order parameter. The study concentrates on the recognition of phase transitions in prominent spin models such as the 2D Ising model, 3D Ising model, and classical 3D Heisenberg model. The proposed methodology involves training ML and DL models on extensive datasets generated from simulations of the aforementioned statistical models. The training process encompasses diverse configurations representing distinct phases to ensure model generalization. We assess the performance of the models by introducing measures designed to emulate the behavior of an order parameter. These measures serve as indicators of phase transitions, allowing for the discrimination between 1st and 2nd order transitions.

Academic year

3rd year

Research Advisor

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Presenter: ABUALI, Ahmed

Session Classification: High Energy and Quantum Field Theory

Track Classification: High Energy Physics, Nuclear Theory and QFT