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Exploration of QCD matter under extreme conditions meets machine learning

Tuesday, 30 April 2024 13:42 (20 minutes)

This presentation will highlight the impactful role of machine learning (ML) in high energy nuclear physics, particularly in studying QCD matter under extreme conditions. The presentation will focus on three key applications: analyzing heavy ion collisions, reconstructing neutron star Equation of State (EoS), and advancing lattice field theory studies.

In heavy ion collisions, ML techniques are crucial for deciphering complex data patterns, offering deeper insights into QCD matter properties. For neutron star EoS reconstruction, ML assists in reversing the TOV equation, revealing the nature of dense matter in these stars. In lattice field theory, ML transforms computational approaches, especially in inverse problem solving and generative tasks, fostering new understanding and efficiencies.

The talk will discuss the blend of data-driven and physics-informed approaches in ML, addressing challenges and future directions in this interdisciplinary field. The aim is to showcase ML as a vital tool for progressing high energy nuclear physics research.

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Session Classification: 1.2 Generative models & Simulation of physical systems