



Deep Learning: Extrapolation Tool for Computational Nuclear Physics

Objectives

- Development of artificial neural networks for extending the application range of the nuclear physics high performance computing simulations based on the ab initio No-Core Shell Model (NCSM)
- Provide a new paradigm for matching Deep Learning with results from high performance computing simulations

Impact

- Can identify solutions where the first-principles methods, such as NCSM, cannot or when the problem becomes too computationally expensive to compute
- Establishes foundation for deep learning tools in nuclear theory useful for a wide range of applications

Accomplishments

- Developed artificial neural networks that extend the reach of high performance computing simulations of nuclei
- Predicted nuclear properties, such as the ground state energy and proton radius, of Li^6 based on achievable ab initio NCSM calculations
- Produced accurate predictions of nuclear properties with quantified uncertainties using fundamental inter-nucleon interactions



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