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Learning Hadron Interactions from Lattice QCD

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In this study, we develop a deep learning method to learn hadron interactions from Lattice QCD calculated correlations unsupervisedly. We present our approach of using neural networks to model potential functions that are learned from Nambu-Bethe-Salpeter (NBS) wave functions. This allows most general forms of interaction potentials to be incorporated into a Schrödinger-like equation for detailed hadron interaction analysis. Our results include validations with separable potentials, Yukawa potentials, and the $\Omega_{ccc} - \Omega_{ccc}$ potentials. The neural networks accurately capture the essential features of these interactions, providing a reliable tool for predicting and analyzing hadron scattering properties. Finally, we present the potential for joint learning from lattice QCD and experimental observations to further improve our understanding of hadron interactions.

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