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Artificial Neural Networks for Nuclear Structure Corrections

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We present a data-driven analysis of dipole-strength functions across the nuclear chart, employing an artificial neural network to model and predict nuclear dipole responses. The network is trained on experimentally measured dipole-strength functions for 216 nuclei and tested on an additional set of 10 nuclei with available data. It not only reproduces known responses with high fidelity but also flags potential inconsistencies in certain experimental datasets, highlighting results that may warrant re-examination. Where experimental information is sparse or absent, the model confirms existing theoretical calculations, demonstrating its broader predictive power for nuclear physics. A version of this network retrained, focused on light nuclei and rigorously physics-informed could offer a powerful tool for delivering nuclear-structure corrections in precision studies of muonic atoms.

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