

Scattering amplitude analysis using neural networks

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A rigorous identification of physical states from scattering experiments is possible by tracing the pole origin of the observed peaks. The identification becomes nontrivial if a peak appears very close to a two-hadron threshold. In this work we discuss how one can utilize a neural network to help map the observed peaks with the nature of S-matrix pole. Specifically, we can teach a deep neural network to identify different line shapes that are consistent with the requirements of S-matrix such as unitarity and analyticity. We apply our method to the case of single-channel low energy nucleon-nucleon scattering and the coupled channel of pion-nucleon system. The information extracted via the deep learning approach can be used as a supplementary method in the extraction of resonance parameters.

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