APCTP SEMINAR

Model-independent analysis of hadron-hadron scattering: a deep learning approach

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ZOOM Webinar

Motivated by the amount of recent observations of new hadron phenomena, such as the *XYZ* states, we propose a deep learning method to analyze the origin of enhancement in the two-particle scattering cross-sections. The method identifies the pole configuration of a coupled channel scattering amplitude, namely the number of poles in each Riemann sheet. The teaching dataset is generated by a generic parametrized S-matrix with controlled pole configurations. To accelerate the training process with acceptable accuracy of the program, we employ the curriculum learning algorithm. We also introduce a systematic way to handle the experimental error bars. For a specific demonstration, we apply the present method to the πN scattering amplitude with $I(J^P) = 1/2(1/2^-)$. We find that the enhancement seen around the ηN threshold is caused by at most two poles in the distant Riemann sheet. Our approach can be applied to various problems of classifying observed peaks especially near thresholds, providing a model independent analysis tool to the conventional model-fitting scheme.

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