

793rd ASRC Seminar

Date: November 12 (Thursday), 10:30~12:00

Location: Zoomによるオンライン会議

Speaker: Dr. Sombillo Denny Lane Basco
(大阪大学核物理研究センター)

Title: Classification of enhancement in nuclear and hadron scatterings using deep learning
(深層学習を用いた原子核とハドロン散乱断面積増大の分類)

Abstract:

We frequently interpret the enhancement in the scattering amplitude as a manifestation of an unstable physical state. A more rigorous analysis requires that we associate at least one S-matrix pole to the enhancement. Some of the poles admit a physical-state interpretation, like a bound state or resonance, while others do not. Nevertheless, they leave an almost identical enhancement in the scattering region. One good example is the nucleon-nucleon low energy scattering, where the bound state pole produces an almost similar enhancement as the virtual state pole. Additional complications are present in coupled-channel scatterings due to the possible enhancement of threshold cusp. It is, therefore, imperative to formulate an algorithm that can help us distinguish scattering enhancements. Our study employs the strength of deep learning to classify the established and recently observed scattering enhancements. We first apply our method to the nucleon-nucleon scattering. Without appealing to deuteron's existence, our deep neural network model was able to identify the amplitude enhancement caused by a bound state pole. In this talk, we describe how to extend our approach to a more general coupled-channel scattering. The extension requires the formulation of the S-matrix model to generate the training dataset and deep neural network design. We also discuss some of our preliminary results.

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