Contribution ID: **160** Type: **Invited**

Machine Learning exotic hadrons

Thursday, 8 June 2023 17:25 (20 minutes)

A densely connected feed-forward neural network is capable to classify poles of scattering matrix if fed with experimentally measured values of energy-dependent production intensity. As shown in [1], such a neural network trained with synthetic differential intensities calculated with scattering length approximated amplitudes classifies the $P_c(4312)$ signal as a virtual state located at the 4th Riemann sheet with very high certainty. This is in line with the results of other analyses but surpasses them by providing the simultaneous evaluation of probabilities of competing scenarios, like eg. the interpretation in terms of the bound state. Studying the dimensionally reduced training and inference data obtained with the Principal Component Analysis gives us a certainty that our physical interpretation is robust. Moreover, using the Shapley Additive Explanations we can identify the energy bins which are key for the physical interpretation.

Bibliography

1. Deep Learning Exotic Hadrons, JPAC Collaboration • L. Ng, Ł. Bibrzycki, J. Nys, C. Fernandez-Ramirez, A. Pilloni, V. Mathieu, A.J. Rasmusson, A.P. Szczepaniak, Phys.Rev.D 105 (2022) 9, L091501

Primary authors: RASMUSSON, A J; SZCZEPANIAK, Adam (Indiana University); Dr PILLONI, Alessandro (UniME & CT); FERNANDEZ-RAMIREZ, Cesar (UNED/ICN-UNAM); NYS, Jannes (Ghent University); NG, Lawrence (Florida State University); MATHIEU, Vincent; BIBRZYCKI, Łukasz (Pedagogical University of Krakow)

Presenter: BIBRZYCKI, Łukasz (Pedagogical University of Krakow)

Session Classification: Analysis tools

Track Classification: Analysis tools